U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE UNIVERSITY OF NEBRASKA, G. E. CONDRA, DIRECTOR, NEBRASKA SOIL SURVEY.

SOIL SURVEY OF SHERIDAN COUNTY, NEBRASKA.

BY

F. A. HAYES, IN CHARGE, AND LOUIS A. WOLFANGER, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND H. L. BEDELL, L. BRITTON, S. C. H. TAYLOR, AND F. M. DEUTSCH, OF THE NEBRASKA SOIL SURVEY.

THOMAS D. RICE, INSPECTOR, NORTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1918.]

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., July 23, 1920.

SIR: In the extension of the soil survey in the State of Nebraska during the field season of 1918 a survey was undertaken in Sheridan County. This work was done in cooperation with the University of Nebraska.

I have the honor to transmit herewith the manuscript report and map covering this work and to request their publication as advance sheets of Field Operations of the Bureau of Soils for 1918, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. E. T. MEREDITH,
Secretary of Agriculture.

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MAP.

Soil map, Sheridan County sheet, Nebraska.

SOIL SURVEY OF SHERIDAN COUNTY, NEBRASKA.

By F. A. HAYES, In Charge, and LOUIS A. WOLFANGER, of the U. S. Department of Agriculture; and H. L. BEDELL, L. BRITTON, S. C. H. TAYLOR, and F. M. DEUTSCH, of the Nebraska Soil Survey.—Area Inspected by THOMAS D. RICE.

DESCRIPTION OF THE AREA.

Sheridan County, Nebr., lies in the northwestern part of the State, adjoining South Dakota. It is 69 miles long north and south, and 36 miles in width east and west, and has an area of 2,433 square miles, or 1,557,120 acres.

The greater part of the county lies in the High Plains division of the Great Plains, but a small part of this has been greatly eroded and the surface is considerably lower than that of the High Plains proper. This division consists of a constructional plain built by depositions of rock débris from the more elevated regions to the west and later very slightly modified by erosion. The northern half is a moderately rolling table-land deeply dissected in the northwestern part by streams leading to the White River in South Dakota. The southern part has been greatly influenced by wind-blown sands, and the topography ranges from almost flat in the more protected areas to hilly and choppy where wind action has been severe.

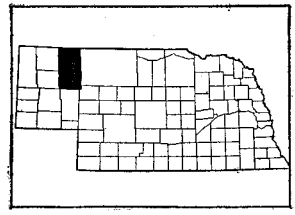

FIG. 1.—Sketch map showing location of the Sheridan County area, Nebraska.

The northwestern tenth of the county consists of the eroded, ragged edge of the High Plains plateau and its rapid descent in the Pine Ridge escarpment to the Crawford lowland lying to the north and west. The greater part of this region is broken, being characterized by steep slopes and high, narrow ridges. Within the larger stream valleys, where erosion has been less severe, the topography is flat to rolling. Terraces or benches, varying in width from one-eighth to three-fourths mile, occur along the larger streams and comprise the most level land in the county.

That part of the county lying between the Niobrara River and the northern edge of the escarpment, and comprising about one-third of its total area, is the highest and most nearly level part. A typical view of this region is shown in Plate I. This table-land is a remnant

of the original High Plains once covering the greater part of western Nebraska. The surface slopes slightly toward the southeast and is cut by numerous parallel, narrow, shallow U-shaped valleys. A small part of this region, in the northeastern part of the county, has been greatly modified by wind-blown sand and has a rolling and billowy topography, typical of the dune-sand area in western Nebraska.

That part of the county lying south of the Niobrara Valley, and comprising about 60 per cent of the total area, slopes gently toward the north and west. Immediately south of the river and extending along the western edge of the county is a narrow belt of gently undulating to rolling country. South and east of this belt lies the western extremity of the vast sandhill region of Nebraska, consisting of a monotonous succession of rounded hills and irregular ridges, with numerous intervening valleys and depressions.

Sheridan County has an average elevation of about 3,700 feet above sea level. The altitude ranges from approximately 4,000 feet north of Hay Springs to about 3,500 feet where the Niobrara River crosses the eastern boundary. The elevation of Hay Springs is 3,831 feet; Rushville, 3,741 feet; Clinton, 3,738 feet; Gordon, 3,556 feet; Antioch, 3,886 feet; Lakeside, 3,887 feet; and Ellsworth, 3,917 feet. The general slope of the plain is southeastward.

The flat flood plain of the Niobrara River lies 100 to 120 feet below the upland level. It varies in width from one-eighth to three-fourths mile. The slopes bordering the river flood plain present two main features. In the eastern part of the county, and extending to within 12 miles of the western boundary, the valley sides are characterized by short, steep slopes, and the entire valley is seldom over 1 mile in width. In the western part, however, the upland on the north side of the stream slopes gradually into a high flat or terrace, varying in width from one-half mile to 3 miles. This terrace lies about 50 feet above the stream channel and is bordered on the south by steep, precipitous slopes, leading to the present flood plain of the river.

With the exception of the northwestern part, the entire county is drained by the Niobrara River and its tributaries. This stream follows a meandering course in a northeast direction across the county. Its valley in Sheridan County is about 42 miles long. The main channel varies in width from 20 to 30 feet, and the fall averages about 13 feet to the mile. Hay Springs, Rush, and Antelope Creeks are the principal tributaries of the Niobrara in Sheridan County. These tributaries, which are intermittent, are for the most part of sluggish flow and bordered by relatively wide flood plains.

The northwestern part of the county drains into the White River of South Dakota. Its largest tributaries in Sheridan County include Beaver, White Clay, and Wounded Knee Creeks. These streams have a very steep gradient and are actively deepening their channels.

South of the Niobrara River the drainage is less complete. The principal streams, Box Butte, Pine, Deer, and Snake Creeks, seldom go dry, even during prolonged drought, but they have very few tributaries, and much of the region depends entirely upon underground drainage.

All the permanent streams, with the exception of Box Butte Creek, are fed by seepage water from the porous sands. The drainage is ample throughout the greater part of the county, but in many places in the lower lying valleys, where the subsoil is more compact and impervious, water accumulates in ponds and lakes, sometimes to a considerable extent.

On the high table-land in the north-central part of the county water is obtained from wells 80 to 200 feet deep. In the sandhill section the wells are much shallower, ranging in depth from 10 to 100 feet, depending upon the location with respect to valleys and hills. The water is generally suitable for domestic use and is ample for farm and ranch requirements. In the extreme northwestern corner of the county it is difficult to obtain water at reasonable depths. The supply is generally alkaline and is suited only for stock purposes. An adequate amount is often obtained, however, by damming the smaller, intermittent drainage ways and holding the water for use during dry periods.

With the exception of the northwestern part and belts along the stream courses throughout the remainder of the county, the country is practically treeless. In the northwestern part the rougher areas are characterized by a fairly heavy growth of scrub pine, while along the streams elm, ash, cottonwood, hackberry, and chokecherry make up the tree growth.

Sheridan County was organized from a part of Sioux County in 1885. Settlement had begun a few years before, and at the time of organization all the land had been filed upon under the public land laws. The first colony came from Indiana and settled near the present site of Gordon. Later settlement spread over the entire county. The early settlers were of many nationalities, but a large percentage was American born.

According to the census the population of Sheridan County increased from 6,033 in 1900 to 7,328 in 1910. The entire population is classed as rural. In 1910, 90.3 per cent of the inhabitants were native white persons, of which 64.5 per cent were of native parentage and 25.8 per cent of foreign or mixed parentage; 9.7 per cent of the population was of foreign birth. The principal foreign nationalities represented are German, Irish, French, English, and Swedish. The most densely populated areas are in the immediate vicinity of the towns, and on the table-land in the north-central part of the county.

The sandhill areas and the rough, broken areas in the northwestern part of the county are very sparsely settled.

Rushville, the county seat, in the north-central part of the county, had a population in 1910 of 633. This town, as well as the entire county, has had a considerable growth in population since the last census. Gordon, about 15 miles northeast of Rushville, had a population of 910 in 1910, and Hay Springs, about 15 miles west of Rushville, a population of 408.[1]

The principal towns in the southern part of the county are Antioch, Hoffland, and Lakeside. These towns have greatly increased in size since the development of the potash industry in Nebraska. Antioch, situated in the southwestern part, is at the present time (1918) the leading potash center of the United States, and several large plants are in operation, producing potash by evaporation from the alkaline water of the numerous sandhill lakes. The plants furnish employment for hundreds of men throughout the year. Hoffland lies in the southwestern part of the county, about 3 miles west of Antioch. Its estimated population is 500. There is operated here the largest plant in the United States producing potash from lake brines. Lakeside has a population of approximately 500. It is a small potash center.

The Chicago & North Western Railroad crosses the north-central part of the county east and west. Gordon, Clinton, Rushville, and Hay Springs are on this line. The main line of the Chicago, Burlington & Quincy Railroad between Omaha and Billings crosses the southern part of the county, passing through Bingham, Ellsworth, Lakeside, Antioch, and Hoffland.

All the roads are of earth construction. Except in the sandhill section and in the northwestern part of the county, where the topography is rough, they follow section lines. The more important roads are well graded and dragged after each rain, but little attention is given to the minor roads. In the sand hills it is impracticable to lay out roads on section lines on account of the absence of surfacing materials, the uneven topography, and the small amount of traffic. Travel is laborious over the constantly shifting sands, with gates on all property lines. Rural mail delivery routes and telephone service reach nearly all parts of the county.

Marketing facilities in the northwestern and central parts of the county are poor. The farmers in the northern part market their products at Hay Springs, Rushville, Gordon, and in the southern part at Antioch, Lakeside, and Ellsworth. The surplus products, including cattle, wheat, and potatoes, are marketed outside the county.

[1] Since this report was written the preliminary announcement of the population of Sheridan County and its civil divisions in 1920 has been issued by the Bureau of the Census, as follows: Sheridan County, 9,625; rural, 9,625; Antioch, 764; Gordon, 1,581; Hay Springs, 577; Rushville, 955.

Wheat is sold chiefly in Omaha, but part of the crop is ground in the flour mills at Gordon, Rushville, and Hay Springs, and sold on the local markets. A small mill is operated on Pine Creek near its junction with the Niobrara River. Most of the grain is handled in elevators situated in the principal towns, and either shipped directly or held until the market is satisfactory. Potatoes are shipped to southern markets. A large starch factory at Gordon affords a market for the smaller potatoes and culls unfit for food. Cattle are shipped to Omaha and Chicago. Most of the dairy products are sold in the local markets.

CLIMATE.

The climate of Sheridan County, which is typical of the High Plains region, is characterized by wide seasonal variations, with a long and cold winter and short and warm summer.

The mean annual temperature, according to the records of the Weather Bureau station at Hay Springs, is 45.2° F. January, the coldest month, has a mean temperature of 20.3°, and July, the warmest, a mean of 70.4°. The absolute minimum temperature is —41° F., recorded in February, and the highest, 105°, recorded in July.

The average date of the last killing frost in the spring is May 16, and that of the first in the fall, September 20. This gives an average growing season of only 127 days, and it is necessary to grow quick-maturing crops to realize the largest returns. The date of the earliest recorded killing frost in the fall is August 25, and that of the latest recorded in the spring, June 21.

The precipitation comes mainly in local showers, and is extremely variable. The mean annual precipitation is 19.9 inches. The low rainfall is compensated in part by the fact that about 72 per cent of it falls during the growing season, from April to September, inclusive. May has the heaviest rainfall, with a mean of 3.25 inches. November, December, January, and February are the driest months, with a mean of less than 1 inch per month. The rainfall in May and June is usually well distributed, but in July, August, and September the distribution is not so favorable, and occasional long droughts occur. The summer precipitation is usually in the form of thunderstorms, and hail sometimes does serious damage to crops over local areas. The average annual snowfall is approximately 30 inches.

The prevailing winds in winter are from the northwest, and during the summer months from the south and southwest. Destructive tornadoes are unknown. Extremely heavy rainfalls, sometimes called cloudbursts, which occur infrequently, do some damage to crops.

While the climate of Sheridan County is not as favorable to the production of large yields of grain as that of the eastern counties of

Nebraska, the farmers have adopted methods that insure fairly good returns, except during the driest years. Careful conservation of soil moisture and the selection of the most hardy and early maturing varieties of grain have resulted in making the tillable parts of the county very reliable in crop production.

The following table, showing the more important climatic data, is compiled from the records of the Weather Bureau station at Hay Springs:

Normal monthly, seasonal, and annual temperature and precipitation at Hay Springs.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1877).	Total amount for the wettest year (1878).
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	24.4	65	−38	0.79	0.37	0.48
January	20.3	67	−34	.67	.15	.21
February	22.1	68	−41	.72	T.	.31
Winter	22.3	68	−41	2.18	.52	1.00
March	32.3	84	−23	1.44	.65	3.69
April	44.9	88	− 5	2.27	.33	1.80
May	54.0	93	11	3.25	3.59	6.53
Spring	43.7	93	−23	6.96	4.57	12.02
June	63.8	103	30	3.12	2.09	5.05
July	70.4	105	36	2.62	.41	6.75
August	69.2	102	26	2.00	.66	2.50
Summer	67.8	105	26	7.74	3.16	14.30
September	59.8	101	14	1.15	1.32	.46
October	47.3	94	2	1.27	1.98	.72
November	33.9	78	−26	.60	.91	.42
Fall	47.0	101	−26	3.02	4.21	1.60
Year	45.2	105	−41	19.90	12.46	28.92

AGRICULTURE.

In 1877 the Sioux Indians were in possession of the area now comprising Sheridan County. When the rush to the gold fields of the Black Hills began, the Indians were collected by the Government and located on the Pine Ridge Reserve in South Dakota, and cattlemen, seeing the advantages of the free open range, began to establish ranches in 1878. In 1883 they were forced out by settlers seeking

homesteads in western Nebraska. A few years of good crops occurred after this and immigration was greatly stimulated, so that by 1885 there was a homesteader on nearly every quarter section. Following this period of rapid settlement there occurred one of the worst droughts the region has ever experienced, culminating in the extremely dry years of 1893 and 1894. Total failures of all crops resulted, and there was a gradual decrease in population that continued through the early nineties. The population prior to this period of immigration was somewhat greater than that reported as late as the 1910 census. It has probably been exceeded, however, since that time.

The droughts would not have checked the development of the county so greatly had the settlers used the present methods of farming. They did not realize the necessity of conserving the soil moisture, and of planting only the most hardy and drought-resisting grains. The combined system of stock ranching and grain farming had not been introduced, and the general financial depression then prevailing over the entire country caused low prices for all agricultural products.

The vacated land was taken up by ranchers, who, combining stock raising and grain farming, made large profits. With the passage of the Kinkaid Act, increasing the size of homesteads to 640 acres, immigration was again stimulated, and within a short time much of the public land was reoccupied.

The following table, compiled from the census, giving the acreage and production of the principal crops of the county in 1889, 1899, and 1909, shows the general trend of agriculture during the preceding 20 years:

Acreage and production of principal crops in the years 1889, 1899, and 1909.

Crops.	1889		1899		1909	
	Acres.	Production.	Acres.	Production.	Acres.	Production.
		Bushels.		*Bushels.*		*Bushels.*
Wheat	27,023	325,984	17,754	127,150	23,388	310,028
Corn	24,325	265,150	12,397	141,660	22,147	404,424
Oats	15,470	237,768	1,749	18,490	16,050	402,292
Barley	2,183	35,981	349	4,020	2,725	49,559
Rye	1,540	17,921	2,228	14,780	1,373	13,240
Flaxseed	277	890	.....	.....	101	389
Emmer	.....	.....	.....	.....	2,332	45,609
Potatoes	1,970	138,594	2,560	137,167	8,590	668,309
		Tons.		*Tons.*		*Tons.*
Hay	37,881	35,633	81,366	78,229	109,559	98,167

At the present time much of the land north of the Niobrara River is held in comparatively small farms used in the production of grain and live stock. An area of the table-land here devoted to alfalfa, corn, and hay is shown in Plate I. Most of the land south of the river is unsuited to crop production and is included in large stock ranches, on which sufficient hay is cut for feeding purposes.

According to the annual report of the Nebraska State Board of Agriculture, corn is the most extensively grown crop in the county. It occupied 40,406 acres in 1917, and gave an average yield of 21 bushels per acre. Only the earliest maturing varieties are planted. Flint corn is grown most extensively, White Flour and White Squaw being the principal varieties. Chadron White, White Cap, and Northwestern Dent are the leading varieties of dent corn. Most of the flint corn is left on the stalk after maturing, and hogs are allowed to run in the field until fattened. The dent corn is usually husked or cut for fodder.

Oats rank next in acreage to corn. In 1917 there were 20,412 acres in this crop, the yield averaging 36 bushels per acre. The principal varieties grown are Kherson, Swedish Select, and Large White Montana. The grain is generally fed to work stock on the farms and ranches, but a few farmers grow a surplus, which is sold on the local markets.

Wheat ranks next to oats in acreage among the grain crops. There were 10,407 acres in wheat in 1917. The acreage of spring wheat is about three times that of winter wheat. The principal spring varieties are Marquis and Bearded Fife. Turkey is the chief winter variety. The average yield of spring wheat is about 12 bushels per acre, and of winter wheat, 15 bushels. Wheat is the principal cash crop of this region. There are four flour mills in the county, but the greater part of the wheat is shipped to eastern markets. The grain is usually of good quality.

Rye occupied about the same acreage as wheat in 1917, and the yield averaged 14 bushels per acre. Within the last two years rye has been gaining in importance, and as it is more drought resistant it will probably exceed wheat in acreage in a short time. A small part of the crop is used in local mills, but the greater part is shipped out of the county.

Barley ranks next to rye in acreage. This crop is grown mainly for stock feed on the farms and ranches. There were 3,641 acres in barley in 1917, with an average yield of 26 bushels per acre.

Emmer is gaining in importance as a feed for hogs. In 1917 there were 1,545 acres devoted to this crop. The average yield is about 30 bushels per acre.

Sheridan County is the leading potato-producing county in Nebraska. In 1917 there were 8,515 acres devoted to this crop, and

the average yield was 125 bushels per acre. Potatoes are grown on the high table-land north of the Niobrara River, without irrigation, and the product is of the best quality. The principal varieties are Early Ohio and Triumph. The potato growers of the county are organized and pledged to produce only the two standard varieties for shipment, the object being to deliver on the market the highest quality possible. Most of the crop is shipped to southern and eastern markets. The growing of seed potatoes for southern trade is becoming an important industry. The inferior potatoes are sold to a starch factory at Gordon.

Beans, flaxseed, and millet are grown, in a small way, for home consumption and for sale on the local markets.

Fruits, including apples, cherries, and plums, are grown to a small extent, but the late spring frosts make fruit crops very uncertain. Strawberries do well, but are not produced commercially. Of the wild fruits, chokecherries, sand cherries, plums, and grapes are the most important. They are quite abundant in favorable seasons.

The area devoted to hay in Sheridan County is considerably greater than that of any of the cultivated crops. In 1917 there were 70,171 acres in grasses cut for hay, of which 56,802 acres were in wild grasses, including western wheat grass, grama grass, buffalo grass, bluestem, sand grass, needle grass, and the sedge blackroot. Of the above species the western wheat grass has the highest feeding value. The average yield of hay throughout the county is about three-fourths ton per acre.

Alfalfa is the principal cultivated hay crop. In 1917 there were 13,269 acres in alfalfa, which gave an average yield of about 2 tons per acre in two cuttings. The alfalfa is used as feed for cattle and hogs.

The greater part of Sheridan County is used as grazing land, and stock raising is the most important industry. The value of live-stock products in 1910 was almost as great as the value of all crops combined. The 1910 census reports 83,100 cattle on farms and ranches in Sheridan County. The animals are principally grade Hereford and Shorthorn, though some farmers have purebred herds. A few dairy cattle, principally of the Holstein breed, are kept. Of the total number of cattle in 1910, 37,687 were cows and the remainder yearling heifers, calves, and bulls. In 1909 a total of 31,160 cattle, having a value of $1,223,993, were sold or slaughtered. Cattle are raised for market and for sale to eastern feeders. They are shipped mainly to Omaha. Practically no grain is fed. If not shipped in the fall, the animals are run on the range throughout the winter, hay being fed in severe weather.

There was a total of 19,648 horses, mainly of light-draft type, on farms and ranches in Sheridan County in 1910, valued at $1,707,710.

Very few mules are raised in Sheridan County, the census reporting only 392 in 1910. There were 2,279 mules and horses sold in 1909.

Hogs and sheep are not raised extensively in this county. In 1909 there were 6,716 hogs and 3,190 sheep in the county. The raising of hogs is becoming more important as the farmers realize that alfalfa for feeding purposes can be successfully grown in many places.

Dairying is not well developed; there are very few strictly dairy herds in the county. Nearly all the farmers, however, sell some dairy products, and in some parts of the county routes have been established for the collection of cream. There were 12,503 gallons of cream sold in 1909.

Poultry farming is not engaged in on a commercial scale, although every farmer has some poultry products to sell. The census reports 62,594 fowls in the county in 1909, in which year the value of the poultry and eggs produced amounted to $86,287.

The farmers realize that the terrace soils along the streams are best suited to the production of alfalfa and corn. The soil here is slightly more moist than on the upland, on account of its flatter surface and lower position. In general the farmers select the deeper, heavier soils of the high table-land for small grain and potatoes, as they are believed to withstand drought better than the light-textured types. The sand hill region and the rough broken country in the northwestern part of county are best adapted to grazing. The lower lying meadows in the sand hills, however, are used almost exclusively for hay production. The first-bottom soils along the permanent streams are recognized as being best adapted to tree fruits.

In preparing new land the sod is broken to a depth of 3 or 4 inches with moldboard plows generally drawn by a tractor. The sod is then double disked, and small grain drilled or sowed immediately. Corn, flax, and beans are sometimes planted on new land shortly after it is broken. In preparing old land for small grain the corn or stubble ground is generally disked and the seed sown and harrowed in. Old land is plowed but once in three or four years. Corn is planted on old corn or stubble land with a lister. The crop is cultivated two or three times.

In growing potatoes the land is plowed early in the spring and the seed planted between the middle of May and the latter part of June, with a single-row, one-man potato planter, at the rate of 5 to 8 bushels per acre. The crop is cultivated three or four times with a one-row corn cultivator. Harvesting begins about October 1. The crop is dug with a 4 to 6 horse elevating digger, the potatoes dropping on the ground behind the machine. They are gathered by hand, graded, and either hauled to the shipping point or stored in pits until harvesting is finished.

Small grain is usually stacked in the open. Thrashing machines begin operation during the latter part of September and by October 30 all the grain usually is thrashed. The crop is hauled direct to the elevators or storing sheds in the towns. When corn matures properly, it is snapped or shucked and stored for winter feed; otherwise stock is turned into the fields to harvest the crop. Some corn is cut for fodder.

Wild hay is cut between August 1 and October 30. It is usually stacked in the open and fed to stock during the winter months. Some hay is shipped out of the county each year.

The machinery and equipment on nearly every farm is adequate for all needs. Four to six horse gang plows are common, and tractors are used on many farms. Hay sweeps and stackers are used extensively in handling the hay crop. The farm and ranch improvements are as good as in any county in western Nebraska. Many of the buildings are 2-story structures, and some of them are equipped with electric lights and running water. The barns are mostly large frame buildings suited to the storing and sheltering of much stock and feed. The fences are all of barbed wire, and are usually kept in good repair. Runways for automobiles have been built in fences along many property lines.

No systematic crop rotation is followed in Sheridan County. Grain fields are often kept in the same crop year after year, but oats are sometimes used as an intermediate crop between corn and wheat. Wheat is occasionally drilled in between corn rows. Potatoes are seldom planted on the same ground two years in succession; they generally follow a small grain.

No commercial fertilizer is used, and manure is seldom applied to the grain lands, as the moisture in the soil is often insufficient to decompose it thoroughly, and there is danger of making the land droughty the following year. Some manure is applied to alfalfa fields.

Farm labor is scarce in this region, especially during the busy season. Farm hands are paid $50 to $65 a month, when hired throughout the year. Day laborers receive $3 to $3.50 during the busy season. Indians mainly are employed in potato harvesting.

According to the census there were 1,310 farms in the county in 1910, ranging in size from 260 acres up to many square miles, the average being 866.8 acres. The 1910 census reports 71.9 per cent of the total area of the county in farms, and 34.5 per cent of the farm land as improved. The average number of acres of improved land in each farm is 299.3. Eighty-five per cent of the farms are operated by the owners.

Over the greater part of the county the selling price of farm land ranges from $15 to $30 an acre. The high table-land best suited for farming ranges in value from $30 to $60, depending upon the location and improvements. The terrace lands along the Niobrara River and other principal streams sell for $40 to $60, depending chiefly on the drainage and location. The rough, broken areas in the northwestern part of the county range in value from $12 to $20 an acre, and the ranches in the sandhill section from $12 to $30, depending upon the proportion of hay land.

SOILS.[2]

The Arikaree formation underlies the greater part of Sheridan County, and most of the soils have either been derived directly from it or modified by its weathered products to a considerable extent. This formation is of Tertiary age, and belongs to the Loup Fork beds. It is sedimentary from material washed down and deposited over a large part of the High Plains from the more elevated regions to the west, and consists of a light-gray, soft sandstone loosely cemented with lime. It is usually fine textured, and weathers into a group of soils ranging in texture from loamy fine sand to heavy silt loam.

Extensive erosion in the northwestern part of the county has resulted in cutting through the Arikaree sandstones and exposing small areas of several of the underlying formations, of which the Brule clay, Pierre shale, and Niobrara chalk are the most important. The Brule clay formation lies below the Arikaree sandstone and consists of massive sediments composed mainly of silt and clay, with a high percentage of very fine sand. It is of pale flesh color. The material weathers into a heavy silty or very fine sandy soil.

The Pierre formation, underlying the Brule clay, consists principally of dark-olive clay loosely cemented into a soft shale. Exposures weather into heavy clay or clay loam soils.

The Niobrara chalk rock, lying directly below the Pierre shale, is the oldest formation exposed in the county. It consists of massive, dark-gray chalk or soft limestone. The Niobrara has not given rise to any soils in Sheridan County, but materials from it have modified to a small extent several of the soils derived mainly from other formations.

On the basis of the processes by which the soil material was accumulated the soils of the county are grouped into three main divi-

[2] Sheridan County joins Box Butte County on the west. In the case of one type the maps of these areas do not appear to agree along the boundaries. The Valentine loamy fine sand in Box Butte County joins the Valentine loamy sand in Sheridan County. In this area all grades of loamy sand, including the loamy fine sand, were combined into one type and called Valentine loamy sand.

GENERAL TOPOGRAPHY OF TABLE-LAND IN THE NORTH-CENTRAL PA

Field of alfalfa in foreground, corn in middle distance, and hay in bac

FIG. 1.—FIELD OF WHEAT ON THE ROSEBUD SILT LOAM.

FIG. 2.—POTATOES ON THE ROSEBUD SILT LOAM.

sions; residual soils, or those lying directly over the formations from which they are derived; alluvial or stream-deposited soils; and eolian or wind-blown soils.

The residual soils, with the exception of those in the northwestern part of the county, have been derived by the weathering in place of the Arikaree formation. The rainfall has been insufficient to leach the lime from the entire 3-foot soil layer, and, while lime is generally absent in the surface material, it is found in abundance in the subsoil, imparting the light color so characteristic of the soils on the High Plains.

The residual soils in the northwestern part of the county have been derived chiefly from the Brule and Pierre formations. They have been considerably modified, however, by colluvial material from the Arikaree and Niobrara formations.

The alluvial soils of Sheridan County occupy both high terraces and poorly drained flood plains along the larger streams. They have been built up principally of materal brought down from the Arikaree and Brule formations of the upland. In the northwestern part of the county, however, the alluvial soils have resulted from a mixture of sediments washed from the Arikaree, Brule, Pierre, and Niobrara formations.

The high terraces represent the oldest alluvial deposits in the county. They lie 10 to 30 feet above the present stream channels and are for the most part well drained. The material consists mainly of silt and the finer grades of sand carried down in times past and deposited in the stream valleys. Subsequent weathering has resulted in the brown-colored soils and white or ashy-gray, highly calcareous subsoils so characteristic of the older alluvial material in the High Plains region.

The first-bottom or flood-plain soils are of recent origin, and in many places are still in process of formation. They lie 1 to 3 feet above the streams and are as a rule poorly drained. Owing to their recent deposition and poor drainage, these soils have not weathered to a sufficient extent to produce the highly contrasting soil profile occurring on the older terraces.

Eolian or wind-blown soils occupy the greater part of Sheridan County, covering most of the area south of the Niobrara River and occurring to a small extent also in the northeastern part. They are composed of materials blown from both the residual and alluvial areas. Strong winds have played an important part in assorting and distributing the materials brought down by the streams. The work of the wind in disintegrating the Arikaree formation and transporting the soil materials in recent geological times, and even at the present time, is very obvious, wind movement being the most

active agent in soil transportation in the county. The eolian soils range from gray sand to grayish-brown very fine sandy loam.

The characteristic light-colored subsoil of the High Plains is well developed in all the soils of the county except those derived from the Pierre shale and those in which the soil material has been accumulated so recently that sufficient time has not elapsed for its development. Such subsoil is developed in all the smooth areas except the first bottoms, those parts of the high table covered deeply by recent accumulations of wind-blown material, and small areas in the northwestern part of the county where the soils have been derived from dark-colored clays. The subsoils, while characteristically light in color and highly calcareous, vary greatly in depth and structure. On the older and flatter remnants of the original High Plains, where undisturbed weathering has continued for a considerable time, the light-colored calcareous subsoil layer is relatively deep below the surface, while in the more rolling and dissected regions, where erosion has removed much of the weathered soil material, it extends to within a few inches of the surface. On the flat areas in the central-western part of the county the subsoil is a heavy clay layer approaching a clay hardpan. This layer generally extends downward throughout the 3-foot section. Soils possessing this characteristic are mapped with the Dunlap series.

On the more nearly level areas in the eroded part of the High Plains and over a considerable area in the northwestern part of the county, the subsoils are characterized by an intermediate, compact layer approaching a hardpan in structure. This layer is seldom over 2 feet in thickness and does not extend to the bottom of the 3-foot section, but is underlain by a white, calcareous lower subsoil. Areas having this compact, intermediate layer are mapped as soils of the Dawes and the Yale series. Over most of the residual areas of the county the hardpan layer is entirely absent from the subsoil, giving rise to the Rosebud and Epping series. The alluvial soils are not yet old enough to develop layers in the soil profile.

In the classification adopted by the Bureau of Soils the soils are grouped into series on the basis of similarity in color, structure, origin, mode of formation, topography, and drainage. The series is divided into soil types on the basis of texture, which depends upon the proportion of mineral particles of different sizes. The type is the unit of mapping.

The residual soils of the county are classed with the Rosebud, Pierre, Dunlap, Dawes, and Epping series. The alluvial or stream-deposited soils are classed in the Tripp, Yale, Orman, Laurel, and Scott series, and the eolian or wind-blown soils in the Valentine and Gannett series and the miscellaneous type of Dunesand.

The surface soils of the Rosebud series are dark gray to brown. The subsoils are light colored and very calcareous. A characteristic feature of this series is the light-gray to almost white color of the deeper subsoil. These soils are derived from the light-colored, very calcareous unconsolidated Tertiary deposits of the High Plains, and come mainly from sandstone, limestone, and shale rocks. The surface ranges from undulating to steeply rolling or even rough and broken.

The soils of the Pierre series occur in the northwestern part of the county, where the drab or slate-colored shales of the Pierre formation are exposed to weathering. The soils have a characteristic olive brown color. The subsoil is usually similar in color to the surface soil, but where the soil covering over the shale is shallow it may be dark drab or slaty. The lighter textured soils of this series have been modified by the admixture of materials from the Brule and Niobrara formations and have a fairly light color. A characteristic feature of the Pierre soils is their extremely sticky nature, which gives them the local name of gumbo.

The Dunlap series is distinguished by its brown to dark-brown surface soils, 6 to 12 inches deep, and by an underlying dark-brown, compact, heavy silt loam. This passes gradually through light-brown or light grayish brown heavy silt loam into light-gray to almost white, floury, calcareous silt loam. The soils of this series occupy the flat tops of the high tables representing remnants of the original High Plains, and the topography ranges from almost flat to gently undulating. The material has been derived through weathering, under conditions of restricted drainage, from the fine-grained, calcareous sandstones of the Arikaree formation. These soils differ from the Rosebud in their heavy, compact subsoil and more nearly level topography.

In the soils of the Dawes series the 3-foot section shows three distinct strata. The surface soil has a brown to dark-brown color not unlike that of the corresponding type of the Rosebud series. The upper subsoil, beginning at a depth of 8 to 12 inches and having a thickness of 6 to 12 inches, is a brown or dark-brown, heavy, compact silt loam to silty clay loam. The lower subsoil is a light-yellow or almost white calcareous silt loam, resembling the lower subsoil of the Rosebud series. The Dawes soils occur in the northwestern part of the county and in places on the high table in the north-central part. Their surface ranges from flat to sharply rolling. The Dawes soils are mainly residual, being derived by weathering from several light-colored silty and fine sandy formations, including the Brule and Arikaree. The surface soils have been modified by wind-blown and alluvial materials.

The Epping series includes types with light-brown to grayish-brown surface soils and light-buff to flesh-colored silty or silty clay

subsoils, usually somewhat heavier than the surface soil. The whole 3-foot section is highly calcareous. The topography ranges from rolling and hilly to almost level. These soils are residual from the Brule clay formation. The material erodes badly and incipient "bad lands" are a feature of the landscape.

The soils of the Scott series are dark brown to almost black, underlain at about 10 inches by heavy, compact, drab clay loam or clay, which usually extends throughout the 3-foot section. The material is of lacustrine origin, the soils occurring in shallow basins or depressions throughout the uplands, associated with the residual types. Drainage is usually poor, and in many areas water stands on the surface a part of the year. Both soil and subsoil are calcareous, and soluble salts often accumulate in injurious amounts.

The members of the Valentine series have brown to dark-brown soils, which in the case of the loam members are slightly sticky when wet. The subsoils are light brown to brown, and usually heavier than the soils. Below 3 feet they grade into loose sand. The types of this series consist of partly weathered wind-laid material originally derived from sandy deposits of Tertiary age. They occupy the level, terrace-like areas along streams, valleys, and basins in the sandhill region. In some places the soil has been modified by alluvial materials. The topography ranges from almost level flats to low rolling dune-shaped hills. The soils are usually well drained, but over much of their area the water table lies near the surface.

The surface soils of the Gannett series are dark gray to black and contain a large amount of organic matter, which in many places is almost abundant enough to produce a Muck. The subsoil is a light-brown to grayish-white sandy loam or sand, which in the lower depths passes into yellowish-brown sand. These soils are developed in inclosed pockets or swales in the sandhill region and represent wind-blown material, mixed with fine wash from the hills and modified by the incorporation of organic matter. They are always poorly drained, and the lower areas are often occupied by marshes or lakes. These soils constitute the valuable hay meadows in the sandhill region of the Great Plains.

The surface soils of the types correlated with the Tripp series are brown to dark brown and underlain by gray to grayish-brown subsoils. The latter are generally calcareous, but are similar in texture to the surface soils. The Tripp series includes alluvial soils developed on terraces lying above overflows. The material consists of sediment brought down from uplands occupied by the Arikaree, Brule, and in places the Niobrara formations.

The soils of the Yale series are brown to dark brown and 6 to 12 inches deep. The subsoil consists of a light-brown, compact silt loam or silty clay loam, which has a hardpan structure and is 8 to 12

inches thick, overlying light-gray or light yellowish-brown, floury silt loam. The soil and upper subsoil are only moderately calcareous, but the lower subsoil has a high lime content. These soils occupy old terraces lying above overflow. In Sheridan County they occur only along Box Butte Creek, in the west-central part. Although the topography is flat, the drainage is adequate, owing to the small rainfall. These soils differ from the Tripp in their compact upper subsoil.

The soils of the Orman series occur on high terraces within, or bordering, outcrops of Pierre shale, and consist largely of reworked Pierre clay modified in places by material from the Brule and Niobrara formations. The surface soils are brown and the subsoils brown or yellowish brown, but both have a slaty or olive-brown tinge characteristic of the Pierre soils. The substratum, occurring at any depth from 10 to 20 inches, really consists of Pierre clay. The topography of the Orman soils is flat to undulating. These soils, like those of the Pierre series, are sticky when wet and bake hard when dry.

The soils of the Laurel series are light brown, and are underlain by yellowish-gray to dark-gray calcareous subsoils. The members of this series occupy first-bottom positions along the Niobrara River and a few of the larger creeks. They are as a rule poorly drained. These soils differ from those of the Tripp series chiefly in topographic position and drainage.

In the following pages of this report the soils of Sheridan County are described in detail and their relation to agriculture discussed. The accompanying map shows the distribution of the soils, while the following table gives the name and the actual and relative extent of each type:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Dunesand	568,256	36.5	Pierre clay loam	8,128	0.5
Valentine loamy sand	188,032	12.1	Laurel fine sandy loam	5,568	.4
Rosebud very fine sandy loam	146,176	11.8	Gannett very fine sandy loam	4,736	.3
Shallow phase	37,824		Scott silt loam	3,584	.2
Rosebud fine sandy loam	137,216	8.8	Dawes very fine sandy loam	3,264	.2
Valentine sand	108,416	7.0	Dunlap silt loam	3,136	.2
Rough broken land	95,104	6.1	Laurel silty clay loam	2,112	.1
Rosebud silt loam	89,984	5.8	Epping silt loam	1,856	.1
Valentine fine sandy loam	45,120	2.9	Laurel very fine sandy loam	1,408	.1
Rosebud loamy fine sand	4,736	1.8	Rosebud gravelly sandy loam	1,344	.1
Shallow phase	23,296		Yale very fine sandy loam	1,344	.1
Gannett fine sandy loam	26,176	1.7	Valentine very fine sandy loam	1,152	.1
Tripp very fine sandy loam	17,792	1.1	Orman silty clay loam	896	.1
Dawes silt loam	11,264	.7			
Tripp fine sandy loam	10,176	.6	Total	1,557,120	
Tripp silt loam	9,024	.6			

ROSEBUD GRAVELLY SANDY LOAM.

The surface soil of the Rosebud gravelly sandy loam is a brown to dark-brown gravelly sandy loam to sandy loam, 10 to 14 inches deep. In places there is a relatively large proportion of finer materials, consisting chiefly of the finer grades of sand, together with some silt and clay. The greater part of the type, however, contains an abundance of coarse sand and gravel. The surface 6 inches is often slightly darker in color than the rest of the soil, owing to an admixture of organic matter. The subsoil varies as widely in color and texture as the surface material, but typically it is a light-gray to gray sand containing considerable coarse sand and gravel. There is usually a larger proportion of white, calcareous silt or silty clay than in the surface material. In the more rolling areas the type often shows little change in either color or texture within the 3-foot section.

The Rosebud gravelly sandy loam is a very inextensive type in Sheridan County, being confined to small isolated bodies in the north-central part. The largest area lies south of the Chicago & North Western Railroad, about 2 miles west of Gordon, and smaller ones occur in the vicinity of Gordon, Clinton, and Rushville. One of the most typical areas is about 1 mile south of Rushville. The type has been derived, through weathering, from sandy strata of Tertiary age. Its lack of uniformity in texture may be due to variations in the original rock or to the amount of reworking and shifting that has taken place.

The topography is rolling to hilly. In general, the type has steeper slopes and is more gullied than the heavier members of the series. It occupies rounded hills and knolls surrounded by other types.

Owing to its small extent and low retentive power, this type is of little agricultural importance. It is porous and poorly adapted to farming in a region of light rainfall. Cultivated crops are grown only in the more level parts, and yields are considerably below the average for the region. The native vegetation consists of sand grass, grama grass, needle grass, and bunch grass. Yucca grows here and there. The type should be left with its native covering of grasses, as it erodes badly when plowed.

Cattle raising is the principal industry on this type, and most of it is used for pasture. It will support 25 to 30 head of cattle per square mile the year round.

This land sells for $20 to $30 an acre, depending upon the improvements, the topography, and the location with respect to shipping points.

ROSEBUD LOAMY FINE SAND.

The surface soil of the Rosebud loamy fine sand is a light-brown to brown loamy fine sand, 10 to 14 inches deep. The immediate surface layer is slightly darker in color, owing to a larger content of organic matter. The soil is generally loose and friable in structure. The subsoil is quite variable in color and texture. In the more nearly level areas the change from soil to subsoil is abrupt, and the latter is a gray or light-gray, very fine sandy loam, having a loose, floury structure. This material contains a relatively large proportion of silt. Where the topography is more rolling the subsoil is a grayish-brown or gray loamy fine sand, changing gradually to fine sandy loam. The lower subsoil is generally calcareous.

The Rosebud loamy fine sand occurs chiefly in small, irregular areas on the south side of the Niobrara River. A few areas are mapped on the north side of the stream, south and southeast of Rushville. The largest and most typical body is developed along the south side of Box Butte Creek, in T. 29 N., R. 45 W. Another, though less typical, area occurs about 2 miles south of Antelope Creek, near the eastern county boundary. Like the other members of the series, the type has been derived from weathered material of the Arikaree formation. Its more sandy character may be due to a difference in the parent rock, but is more probably attributable to the leaching out of the finer soil particles or their removal by the wind.

This type ranges from gently undulating to hilly. Most of it is too rolling to be well adapted to agriculture. While there are few streams on this type, drainage is good owing to the porosity of the materials.

The Rosebud loamy fine sand is not suited to cultivated crops, and it is used exclusively as pasture land. The native vegetation consists of sand grass, stipa grass, and small amounts of bluestem. Some yucca grows in the more rolling areas. The type will support about 90 head of cattle per square mile during the summer months, or 25 to 30 head the year round.

Areas of the Rosebud loamy fine sand can be bought for $10 to $20 an acre, depending upon the improvements. The soil is generally sold in connection with other types and its selling price is influenced by the surrounding soil.

Farmers realize that this type is best suited for pasture, as the topography is unfavorable for cultivation and the soil blows badly when the sod is broken.

Rosebud loamy fine sand, shallow phase.—The Rosebud loamy fine sand, shallow phase, consists of brown to light-brown loamy fine sand to fine sandy loam. In the more nearly level areas, where ero-

sion has been retarded and the soil protected from blowing, it changes at about 8 inches to a light grayish brown or gray loamy fine sand to fine sand. The phase is underlain at shallow depths by the white, calcareous Arikaree formation, bedrock being nowhere more than 3 feet below the surface. Over the greater part of the phase outcrops are numerous, giving the soil a spotted appearance.

This phase is not very extensive. It occurs in narrow eroded strips along the Niobrara River and its southern tributaries. One of the largest and most typical bodies lies along the south side of the stream between Deer and Pine Creeks. Another large body occurs near the mouth of Box Butte Creek, and there are smaller bodies along Box Butte, Pine, and Deer Creeks.

The Rosebud loamy fine sand, shallow phase, has been derived from the underlying Arikaree formation, under conditions unfavorable for deep soil weathering. The soil material has been removed almost as fast as accumulated, leaving large exposures of the parent rock material.

This soil has a rolling to dissected topography. Along stream channels and around the heads of the larger drainage ways the topography is very rough and dissected. Drainage is good throughout the phase and over most of its area is excessive, the run-off being so rapid as to cause severe erosion.

Owing to its small extent and poor adaptation to crop growth, this phase is of little agricultural importance. It is used chiefly as pasture land. The native grasses afford good pasturage and the rough topography protects stock during severe weather. Bunch grass, grama grass, and buffalo grass are the principal pasture growths. As on the shallow phase of the Rosebud very fine sandy loam, red-topped bunch grass is the predominant species. Yucca or bear grass grows in some of the more exposed areas.

Because of nearness of the underlying rock to the surface and the tendency of the soil to drift, the phase is unsuited to crop production and is used exclusively for stock raising. It will support from 30 to 40 head of cattle per square mile throughout the year.

Land of this phase sells for $10 to $15 an acre, depending upon the improvements and topography.

ROSEBUD FINE SANDY LOAM.

The soil of the Rosebud fine sandy loam is a brown to light-brown or grayish-brown loose fine sandy loam, 10 to 14 inches deep. The upper 6 inches contains considerable organic matter and has a slightly darker color. Below 6 inches there is a deficiency in this material. The subsoil is a light-gray to yellowish-gray very fine sand to medium sand, containing a relatively large percentage of silt or silty clay. In places the upper subsoil is slightly compact. Be-

low 30 inches fragments of white limestone or sandstone are sometimes encountered. Over small areas the lower subsoil consists of white, calcareous silty material much resembling that of the Rosebud silt loam.

The Rosebud fine sandy loam is scattered over the residual part of the upland. It occurs chiefly in a wide, irregular strip between areas of the heavier Rosebud soils and the Valentine soils. This strip extends in a northeast-southwest direction from the eastern county line almost to Alkali Lake, southeast of Hay Springs. It is cut by numerous streams flowing in a southeasterly direction and includes many small bodies of other soil types. Large areas occur south of the Niobrara River in the western part of the county.

The Rosebud fine sandy loam has been formed by the weathering in place of sandy Tertiary strata. The large sand content has probably resulted either from the addition of wind-blown material from areas of the Valentine soils and Dunesand or by a gradual removal of the finer particles through leaching or wind action.

The type is flat to gently rolling. It is traversed by intermittent streams flowing in a southeasterly direction. Over much of its area it is difficult to trace the stream channels, as the surplus water quickly sinks into the loose, porous soil and subsoil.

Owing to its large extent, this is an important agricultural soil, but its lower power to retain moisture makes it less valuable than the heavier members of the series. A relatively small acreage is under cultivation, most of the type being used for pasture and hay land. The native vegetation varies according to the content of sand in the soil. Over the heavier, more nearly level areas blackroot, buffalo grass, and grama grass predominate, while in the sandier areas bordering the Valentine soils stipa or needle grass and sand grass are most common. Wheat, potatoes, rye, oats, and corn are the most important of the cultivated crops.

Flax, beans, alfalfa, and millet are grown to a small extent. Wheat and potatoes are the principal cash crops; rye, oats, and corn being grown for home consumption. The White Eureka or Cobbler potato is grown most extensively, as it thrives better on this sandy soil than other varieties. Most of the type is included in stock farms and ranches and devoted chiefly to raising beef cattle. Every farm has a small quantity of dairy products to sell. Horse raising is engaged in to a small extent. This soil will support about 100 head of cattle per square mile during the summer grazing season or 25 to 35 head the year round. The average yield of wheat is about 14 bushels; potatoes, 75 bushels; rye, 14 bushels; oats, 25 bushels; and corn, 15 bushels per acre. Native grasses yield one-fourth to one-half ton of hay per acre, depending upon the seasonal conditions.

The same methods of cultivation are followed on this type as on the heavier soils of the series. Greater care must be taken, however, to prevent drifting and at the same time conserve sufficient moisture for crops.

Areas of the Rosebud fine sandy loam can be bought for $15 to $30 an acre, depending upon the improvements and the location with respect to markets.

This type is naturally very productive, and in average years good yields are produced. There is danger of soil drifting when the surface material is kept in a loose condition, and it is advisable to grow only those crops that require minimum tillage.

In the following table the results of mechanical analyses of samples of the soil and subsoil of the Rosebud fine sandy loam are given:

Mechanical analyses of Rosebud fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372851	Soil	0.1	1.0	2.8	37.9	34.6	15.5	8.0
372852	Subsoil	.4	2.4	4.4	34.9	30.3	19.2	8.6

ROSEBUD VERY FINE SANDY LOAM.

The surface soil of the Rosebud very fine sandy loam is a brown to light-brown very fine sandy loam, 10 to 16 inches deep. The subsoil is a light-brown to ashy-gray material, largely composed of lime below 24 inches. The subsoil section is generally loose and floury throughout, though in places the upper stratum is slightly compact. Below 30 inches the subsoil in places differs from the typical subsoil in containing a much larger percentage of very fine sand, the texture here and there approaching a loamy very fine sand.

This is one of the most extensive "hard-land" soils in Sheridan County. It occurs in the residual uplands in the northern half, generally in irregular areas, ranging in size from a few acres to several square miles. The largest and most uniform development extends from the vicinity of Rushville north and east to a point about 3 miles northeast of Gordon. Another large though less uniform area borders the Valentine soils in the northeastern part of the county. Smaller areas lie in the vicinity of Hay Springs and throughout the region between the Chicago & North Western Railroad and the Niobrara River. Very few areas occur south of the river, the largest being mapped north of Box Butte Creek, in T. 28 N., R. 46 W.

Like the Rosebud silt loam, this soil has been derived by the weathering in place of sandy Tertiary strata, principally the Arikaree. Bedrock occurs at varying depths, and outcrops in places on the hillsides. The topography ranges in general from flat to gently rolling, but the type is much dissected around the heads of the larger drainage ways. The streams are for the most part deeply entrenched and bordered by steep slopes. Drainage throughout the type is good and in a few places excessive. Much of the rainfall passes into the porous soil and subsoil.

Owing to its large extent and nearness to markets this is one of the most important agricultural soils of Sheridan County. It ranks very favorably with the Rosebud silt loam as a cropping soil. Like the latter type, however, the greater part of it is used as pasture and hay land. The cultivated area has greatly increased during the last few years.

The native vegetation on this type differs little from that on the Rosebud silt loam. In addition to the grasses on the latter type there are a few that thrive on the more sandy soils such as this, including needle grass and sand grasses. Of the cultivated crops, wheat, potatoes, rye, oats, and corn are the most important. Alfalfa is occasionally grown, but this crop does not do so well as on the lower lying soils of the Tripp series. Beans, flax, emmer, and millet are grown to a small extent. Wheat, rye, and potatoes are the principal cash crops. Wheat and rye are sold to mills and elevators in the towns. Potatoes are hauled to the railroad for shipment out of the county. Corn and oats are all fed on the farm where grown. A small amount of corn is annually shipped in for feed.

As is the case in general throughout the county, live stock is the most important source of farm income on this soil, and cattle raising is the principal animal industry. Grade Hereford and Shorthorn cattle predominate. Dairying is not carried on extensively, though every farmer has some dairy products to sell. There is a small herd of horses on nearly every farm. The soil will support about 100 head of cattle per square mile during the summer and fall, and 30 to 40 head when grazed throughout the year.

In average years wheat yields about 15 bushels per acre; potatoes, 150 bushels; rye, 15 bushels; oats, 30 bushels; and corn, 18 bushels. Native hay yields one-fourth to three-fourths ton per acre, depending upon the rainfall. The general practice is to farm this soil in conjunction with the Rosebud silt loam, the sandier and rougher land being used for pasture and hay where both types occur on the same farm.

Crops on this type are planted and cultivated in the same manner as on the Rosebud silt loam. The very fine sandy loam, however, is

slightly more tractable owing to its larger sand content, and it can be worked under a wider range of moisture conditions. It is thought somewhat more retentive of moisture than the silt loam. No commercial fertilizers are used on the type.

This land sells for $25 to $50 an acre, depending upon the improvements and location. Areas lying near the larger towns have been sold for as much as $75 an acre.

The Rosebud very fine sandy loam is naturally a very productive soil. When properly managed it will produce good yields of all the crops common to the region, except during the driest years. It is advisable to keep the surface well tilled to minimize loss of moisture by evaporation.

Rosebud very fine sandy loam, shallow phase.—The surface soil of the Rosebud very fine sandy loam, shallow phase, is a brown to light-brown very fine sandy loam to silt loam. In places where conditions have favored the accumulation of organic matter the soil may assume a dark-brown color. On the more nearly level areas where erosion has not been excessive the soil changes at 6 to 10 inches into a light-gray to almost white very fine sandy loam. The Arikaree bedrock lies nowhere deeper than 3 feet, and over most of the phase it outcrops in many places, giving the soil a spotted appearance.

The Rosebud very fine sandy loam, shallow phase, is an inextensive soil found in scattered areas over the entire upland in the northern and western parts of the county. The areas are irregular in outline. They occur chiefly in the northwestern part, adjacent to the areas of Rough broken land. Smaller areas occur along the eroded belts near stream channels and upon the high table in the north-central part of the county. A very typical, though small, area lies north of the railroad track in Hay Springs.

The surface of this soil is rough, though not so broken and dissected as that of the Rough broken land. Drainage as a rule is excessive, and the soil erodes badly.

The shallow phase of the Rosebud very fine sandy loam is unsuited to crop production, as the nearness of the bedrock to the surface prevents the use of farm implements. The phase is used entirely as hay and pasture land. The rough topography affords protection for stock during severe weather. The native vegetation consists of bunch grass, buffalo grass, grama grass, and blackroot, a sedge. Red-topped bunch grass is the most important species, and, together with the white outcrops of the Arikaree bedrock, it gives the phase a spotted red and white appearance. In the rougher areas of the phase a growth of scrub pine covers some of the land, but it is of unusual occurrence, as areas supporting this tree are generally sufficiently dissected to be mapped as Rough broken land. Stock

raising is the chief industry on this soil. It will support 25 to 30 head of cattle per square mile the year round.

Land of this phase can be bought for $10 to $12 an acre, depending upon the location. It is usually sold in conjunction with other farm land, and the price obtained depends upon the percentage of the shallow phase included.

ROSEBUD SILT LOAM.

The Rosebud silt loam, to a depth of 8 to 10 inches, is a mellow silt loam, ranging in color from light brown to dark brown, depending upon the content of organic matter. The soil is darker in the flatter areas, where there has been a greater accumulation of this material. The upper subsoil is a light-brown or light-grayish brown silt loam. It is somewhat compact in place, but generally becomes a loose, floury material when rubbed between the fingers. Below about 20 inches the subsoil gradually becomes lighter in color, and at 24 inches it is a white to ashy-gray, loose, floury silt or silty clay. This material continues throughout the 3-foot section.

There is a moderate lime content in the surface soil. The subsoil is calcareous throughout, and the white material in the lower part is largely composed of lime. Below 30 inches fragments of limestone or calcareous sandstone are commonly present. The unweathered Arikaree formation lies deeper than 3 feet, though in the more rolling areas it outcrops in places, giving rise to the characteristic white spots on the hillsides.

The Rosebud silt loam is relatively extensive in Sheridan County. Like the other members of the series, it occurs throughout the residual part of the upland. The largest area lies north of the Chicago & North Western Railroad between Rushville and the western county line. A large, irregular area extends in a northwest direction north of Gordon, and small, isolated bodies are scattered throughout the Rough broken land in the northwestern part of the county.

The typical Rosebud silt loam in general has been derived through weathering from the calcareous sandstone of the Arikaree formation. In the northwestern part of the county, however, it is mapped among the exposures of the Brule formation.

The topography ranges from almost flat to gently undulating. By far the greater part of the type occupies smooth, undulating plains. It is most rolling in proximity to the eroded belts along stream channels.

The greater part of the type is traversed by intermittent streams flowing in rather deep but narrow channels in a southeasterly direction. The porous subsoil and substratum of the type insure ample underdrainage.

This is one of the most important agricultural soils in the county. Only about 25 per cent of it is under cultivation, but the proportion is nearly as large as in case of any other soil in the region. The uncultivated areas support an excellent growth of pasture and hay grasses, of which western wheat grass, buffalo grass, grama grass, bluestem, and the sedge, blackroot, are the most important. The poisonous locoweed grows in a few places. The most important cultivated crops are wheat, potatoes, rye, oats, and corn, named in the order of their importance. Beans, flax, millet, cane, and emmer are occasionally grown. Wheat is the principal cash crop. Plate II, figure 1, shows a good field of wheat on this soil. Spring wheat is grown chiefly, though winter wheat is gradually gaining in importance. Potatoes rank second as a commercial crop. Early Ohio and Triumph are the principal varieties. A field of potatoes on the Rosebud silt loam is shown in Pl. II, fig. 2. Rye, oats, and corn are grown chiefly for feeding purposes, though rye is rapidly gaining in importance, and small quantities are shipped out each year. A few acres of beans are grown for market on many farms, large navy and pinto being the principal varieties. Millet and sorghum are grown for hay and fodder. The emmer produced is either sold or fed to stock on the farm.

Most of the type is included in stock farms and ranches on which beef cattle are raised. The herds are composed of Hereford, Shorthorn, and Angus grades. A few dairy cattle are kept, mostly of the Holstein breed. Cream is hauled to the railroad for shipment, as there are no creameries in the county. Nearly every ranch has a small herd of horses. The type supports 40 to 50 head of cattle per square mile when used for all-year range, and about 100 head when grazed only during the summer season. The average yield of wheat is about 15 bushels per acre; potatoes, 125 bushels; rye, 14 bushels; oats, 30 bushels; corn, 18 bushels; beans and flax, 12 bushels; emmer, 30 bushels; millet, 1½ tons; and sorghum, about 3 tons. Native grasses yield one-fourth to 1 ton of hay per acre, depending upon the rainfall.

The Rosebud silt loam when properly managed is easily kept in good tilth. If it is plowed when wet, there is a slight tendency to clod, but the clods are easily reduced. More power is generally required in tillage than on the more sandy types. Under present methods of tillage the soil retains sufficient moisture to insure crops, except in years of prolonged drought.

No definite rotation is followed, as the soil is "new" and in no immediate danger of becoming exhausted. Small grains are usually drilled in on old stubble or corn land. Potatoes and corn usually follow a small grain. Corn is listed, as the soil holds moisture better

than where surface planted. Flax and beans are usually seeded on sod breaking. No fertilizers are used on this type.

Land of the Rosebud silt loam can be bought for $25 to $60 an acre, depending upon the improvements and distance from market. The lower prices apply to the rougher land more remote from markets, and are based on the pasturage and hay value.

This is one of the strongest soils of the High Plains region, and its productiveness could be greatly increased by following more intensive cultural methods designed to conserve moisture. Thorough preparation of the seed bed for small grains is advisable, even at the expense of a reduction in acreage. Corn and potatoes should be cultivated often, in order to keep the surface soil well mulched.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Rosebud silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372819	Soil	0.1	0.4	0.3	4.1	27.5	51.6	16.0
372820	Subsoil	.8	2.4	1.3	11.7	41.0	35.7	6.8

PIERRE CLAY LOAM.

The surface soil of the Pierre clay loam is a brown to grayish-brown clay loam with an average depth of about 12 inches. It usually contains considerable very fine sand and silt, but not enough to destroy the sticky, tenacious nature of the soil when wet. The surface cracks badly upon drying. The subsoil is a dark-brown to almost black, heavy, compact clay, mottled over much of the type with blotches of dark gray. Below 30 inches the material is in places slightly more friable, though very compact. The lower subsoil is calcareous.

Adjacent to and often surrounded by the Pierre clay loam are small areas of typical Pierre clay, which are not of sufficient extent to warrant mapping as a separate soil type. The largest and most typical area occurs 2 miles south and 4 miles east of the northwest corner of the county. The surface soil here is a very dark gray to olive-brown, heavy, sticky clay, 10 to 15 inches deep. The subsoil, however, very much resembles that of the clay loam, being a mottled dark-brown and gray, heavy, compact clay. The lower subsoil is slightly calcareous.

The Pierre clay loam occurs in the northwestern part of the county. It is not an extensive type, the largest and most typical area lying north of Lime Kiln Creek. Small areas occur along Beaver Creek and its tributaries.

The type, which is of residual origin, is derived from several formations. The surface material has weathered from the Niobrara, Pierre, and Brule formations, while the subsoil is derived wholly or in large part from the Pierre shales.

The topography is rolling to hilly, rounded hills and ridges intervening with narrow valleys. Outcrops of the underlying Pierre and Niobrara formations are of common occurrence. Surface drainage is good and in places excessive.

Probably not over 5 per cent of this type is cultivated. Most of it is used for pasture or for the production of hay from the native grasses, consisting chiefly of western wheat grass, with small amounts of buffalo grass and grama grass. Corn and wheat are the principal cultivated crops. Yields on this soil are low, on account of its heavy nature and droughtiness. The yield of wild hay is from one-fourth to one-half ton per acre, depending upon the season. It is of relatively high feeding value. It is stated that the hay will keep working stock in good condition without grain.

Land values average $8 to $12 an acre, depending upon the location and water supply. It is extremely difficult to obtain well water, and the water used is from artificial ponds made by damming the smaller streams.

Within the Lime Kiln Creek drainage basin in the northwestern part of the county there are a few areas of a shallow variation of the Pierre clay loam in which the subsoil differs considerably from the typical. The surface soil to an average depth of about 10 inches is a heavy, compact silty clay loam to clay loam, with in many places a relatively large percentage of very fine sand. The material is usually dark gray to dark grayish brown, but ranges from light to dark brown. The immediate surface generally presents an ashy-gray color in the field. The upper subsoil is a mottled gray and dark-gray, heavy, compact clay to silty clay. Below 18 inches the subsoil gradually becomes lighter in color and loses much of its mottling, becoming a pinkish-gray to yellowish-gray, highly calcareous clay. The heavy, compact structure continues throughout the 3-foot section. The lower subsoil differs from that of the typical Pierre clay loam in its lighter color. Areas of this variation range in size from a few acres to about 3 square miles, but they are few in number. The soil represents an intermediate type between the Pierre clay loam and Epping silt loam. It occurs where the Niobrara formation, a chalky limestone, outcrops at frequent intervals, and is probably derived from an admixture of material from this rock and from the Pierre and Brule formations.

The topography is for the most part rolling, but in places it becomes undulating or almost flat. Drainage is everywhere good.

Most of the streams have steep-walled channels, owing to the resistance of the soil to weathering. Probably not over 2 per cent of this soil is under cultivation. The surface cracks badly in dry weather and crops are unable to obtain sufficient moisture during periods of prolonged droughts. The native vegetation consists of western wheat grass, grama grass, buffalo grass, and some bunch grass. Corn, wheat, and oats are the leading crops. The yields are slightly below the average for the region. This soil will support from 40 to 50 head of cattle per square mile the year round. Over much of this variation it is extremely difficult to obtain water either for stock or household purposes. A few wells yield hard alkaline water, and the ranchers depend almost entirely upon the streams for their supply. The selling price of this land varies from $15 to $25 an acre, depending upon the topography and water supply. Sufficient water could probably be obtained by damming many of the small intermittent drainage ways and holding the surplus water for use in dry seasons.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the typical Pierre clay loam:

Mechanical analyses of Pierre clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372829, 372831	Soil	0.0	1.4	0.6	8.9	25.3	40.1	23.6
372830, 372832	Subsoil	.2	.5	.4	5.7	21.9	39.1	32.0

DUNLAP SILT LOAM.

The Dunlap silt loam in this county is identical with that mapped in Dawes County, to the west. The surface soil is a brown, mellow, friable silt loam, 12 to 14 inches deep, slightly more compact than the surface soil of the Rosebud silt loam. Usually it is a typical silt loam, but in places it contains a relatively large proportion of very fine sand. The surface 6 inches is rich in organic matter. The upper subsoil, above 20 inches, is a dark grayish brown, compact, heavy silt loam. This grades into a gray or grayish-brown heavy silt to silty clay which usually continues throughout the 3-foot section. In places, however, the material changes rather abruptly at about 30 inches into a light-gray or white, floury silt to silty clay, closely resembling the lower subsoil of the Rosebud silt loam.

The soil and upper subsoil are only slightly calcareous, but the lower subsoil contains a high percentage of lime.

The Dunlap silt loam is mapped in several small areas along the western county line, in townships 30 and 31 north. They occur along the eastern extremity of the "Dawes Table," the greater part of which lies in Dawes County.

This soil occupies the almost level remnants of the High Plains. It is residual in origin, having been derived from the underlying Arikaree formation through extensive weathering under conditions of poor drainage. The heavy, compact structure of the subsoil is due to a downward translocation and concentration of the finer soil particles during the process of weathering.

The topography is flat to very gently undulating, the general slope of the surface being slightly to the southeast. Surface drainage is not well established, but the slight slope is generally sufficient to dispose of the water not absorbed by the soil.

On account of its high-producing power and adaptation to crops, this is an important soil. Approximately 30 per cent of it is under cultivation, the remainder being used for pasture and wild-hay production. The native grasses include western wheat grass, grama grass, and buffalo grass, the first two predominating. Of the cultivated crops, wheat, rye, potatoes, corn, and alfalfa are the most important. Beans, emmer, and flax are occasionally grown. Wheat is the principal money crop. Spring wheat is grown most extensively, Marquis and Bearded Fife being the principal varieties. Winter wheat is gaining in importance, as it gives the larger yields, except when injured by freezing. Turkey is the principal winter variety. Rye ranks second as a cash crop. Potatoes are grown chiefly for home consumption, though some farmers make this a commercial crop. Early Ohio and Triumph are the principal varieties. Corn and alfalfa are fed to cattle and horses on the farms where produced.

The methods of planting and cultivation are the same on this soil as on the Rosebud silt loam. The average yield of wheat is about 15 bushels per acre, rye 14 bushels, potatoes 100 bushels, corn 18 bushels, beans 12 bushels, emmer 30 bushels, and flax 12 bushels. Alfalfa yields 1 to 3 tons per acre, depending upon the rainfall. The annual yield of native hay is one-half to three-fourths ton per acre.

Land of the Dunlap silt loam can be bought for $25 to $35 an acre, depending chiefly upon the improvements.

This is one of the best dry farming soils in Sheridan County. It is naturally productive, retentive of moisture, and easily kept in a good state of tilth. The type should be more extensively used for crop production, as much larger returns are obtained from the lands in cultivated crops than from land used as pasture or for the production of wild hay.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Dunlap silt loam:

Mechanical analyses of Dunlap silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372853	Soil	0.0	0.0	1.0	6.0	30.6	43.5	19.0
372854	Subsoil	.0	.0	.9	9.4	26.8	36.3	26.6

DAWES VERY FINE SANDY LOAM.

The Dawes very fine sandy loam consists of a brown to light-brown friable very fine sandy loam, 8 to 10 inches deep. The surface portion is rich in organic matter. The upper subsoil, which averages about 10 inches in thickness, is a more compact, grayish-brown silt to silty clay, in many cases containing a relatively large proportion of very fine sand. It ranges in structure from only slightly more compact than the surface soil to a heavy, compact hardpan, in a few places extending to 30 inches. The lower subsoil is a loose, friable, in places floury, silt to silty clay, of light-gray to almost white color. The surface soil is only moderately calcareous, but the lime content increases with depth and is very high in the lower subsoil.

The Dawes very fine sandy loam occurs in an irregular area in the north-central part of the county. Rushville is situated on this type. It occupies a flat, basinlike area, somewhat lower than the surrounding country. Drainage is poorly established over most of the type, but owing to the light rainfall, water seldom accumulates on the surface.

This soil has been derived, through weathering, from the underlying Arikaree formation. The heavy nature of the upper subsoil is probably due to the translocation downward and concentration of the finer soil particles in a lower zone of the profile.

Although this type is of small extent, it is an important soil on account of its central location and nearness to market. About 40 per cent of it is under cultivation, the remainder being used for pasture and hay land. The native vegetation consists chiefly of grama grass, buffalo grass, and western wheat grass.

All the crops common to the region are successfully grown on this soil. The heavy, compact, upper subsoil seems to have little or no injurious effect. Wheat, potatoes, and corn are grown extensively, the first two as cash crops. The wheat is sold to the local mills and elevators, while the potatoes are shipped to eastern markets. Corn is generally fed on the farm where produced. Stock raising is

the chief industry on this soil. Dairying is not engaged in extensively, though milk and butter are produced on every farm to supply home needs, and on some there is a surplus for sale.

In average years wheat yields about 15 bushels per acre; rye, 15 bushels; potatoes, 100 bushels; and corn, 18 bushels. Crops are planted and cultivated in the same manner as on the Rosebud silt loam. No fertilizers are used and no definite crop rotation is followed, as the soil is in no immediate danger of becoming exhausted.

Land of the Dawes very fine sandy loam sells for $40 to $70 an acre, the higher prices obtaining in the better locations and not indicating greater producing power of the soil.

The following table gives the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Dawes very fine sandy loam:

Mechanical analyses of Dawes very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372848	Soil	0.3	0.9	1.3	12.9	38.6	37.7	8.5
372849	Subsoil	.1	.3	.8	12.6	37.9	36.5	11.5
372850	Lower subsoil	.0	.0	1.2	13.7	30.9	35.7	18.5

DAWES SILT LOAM.

A 3-foot profile of the Dawes silt loam shows the intermediate compact layer so characteristic of the series. The surface soil to a depth of 8 to 10 inches is a brown, friable silt loam. The surface 6 inches contains considerable fine sand, and over small areas approaches a very fine sandy loam in texture. The subsoil above 20 inches is a light-brown to grayish-brown, heavy, compact silty clay loam. The lower subsoil is a yellowish-gray, flesh-colored or almost white, loose, floury silt to silty clay. There is considerable variation in the thickness of the upper subsoil. In some places it is 20 inches, and in others not more than 4 inches thick, the average being about 10 inches. Over some small areas the lower subsoil is a very fine sandy loam.

The Dawes silt loam occurs chiefly in the northern and northwestern parts of the county. The largest and most uniform area lies in the northwestern part, in the vicinity of Sheridan Gate. Another large area is mapped along Patton Creek southeast of Dewing, and a small one along Antelope Creek about 3 miles north of Clinton. The type is of residual origin, weathered principally from the light-colored silty clay of the Brule formation. The surface soil has been somewhat modified by windblown and colluvial

material, but the subsoil is derived solely from the Brule clay, except in the small area north of Clinton where the type overlies beds of the Arikaree formation.

The surface in general is that of a gently rolling to rolling plain, with a decided slope to the northwest. In places the type has been deeply eroded and is steeply rolling. Outcrops of the Brule formation are numerous along the larger drainage ways. Over small areas the topography is flat or very gently undulating, but drainage is everywhere good and in places excessive.

This is a fairly productive soil, comparing favorably with the Rosebud silt loam, but owing to its less desirable location with respect to markets it is little used for crop production. The greater part is included in pastures, on which beef cattle are grazed. The native vegetation consists principally of grama grass, buffalo grass, the sedge, blackroot, and western wheat grass. Corn, wheat, rye, and alfalfa are grown to a small extent.

About 12 acres of land are necessary to support each head of stock, and in winter hay is required to supplement the pasturage. Native hay yields one-fourth to three-fourths ton per acre, depending upon the rainfall. Corn yields about 18 bushels, wheat and rye 15 bushels, and alfalfa 1 to 3 tons, per acre. The soil is cultivated in the same manner as the Rosebud silt loam. No definite crop rotation is followed.

This land can be bought for $15 to $20 an acre, depending upon the improvements.

The success attained with alfalfa on this soil in Dawes County would indicate that the crop could be grown successfully here. The hay would greatly increase the stock-carrying capacity of the type and also afford excellent feed during severe weather.

Below are given the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Dawes silt loam:

Mechanical analyses of Dawes silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372841	Soil	0.0	0.0	0.8	3.7	26.1	52.0	17.4
372842	Subsoil	.0	.7	.9	7.9	22.3	43.5	24.8
372843	Lower subsoil	3.2	6.1	2.8	13.1	18.1	39.5	16.9

EPPING SILT LOAM.

The surface soil of the Epping silt loam is a light-brown to gray, friable silt loam, 8 to 10 inches deep, normally containing a relatively large percentage of very fine sand. In the more nearly level areas,

where erosion has not been severe, the soil is often dark brown, owing to a large content of organic matter. The surface material is underlain by lighter colored, heavy silt loam. Below 20 inches the subsoil becomes a light-gray to almost white, loose, floury silty clay. Over much of the type the flesh-colored silty clay of the Brule formation is encountered within the 3-foot section, and in places it outcrops, giving the land a spotted appearance. This soil is not uniform over large areas, as the depth and color of the surface material vary with the topography and the progress of erosion. Both soil and subsoil are calcareous.

The Epping silt loam occurs in small, irregular areas in the northwestern part of the county. The largest and most typical area occupies the divide between Lime Kiln and Patton Creeks, in T. 35 N., R. 45 W. Smaller areas lie along the tributaries leading to these streams. A small though uniform area is mapped around Sheridan Gate, in T. 33 N., R. 46 W.

This type is residual from the underlying Brule formation, whose pale-pink or almost white clay gives the soil its light-colored, floury character. The surface features vary from steeply rolling slopes to almost level flats, but by far the greater part of the type is steeply sloping. Drainage is generally excessive and dissection has been rapid. The stream banks are bare of vegetation and incipient "bad lands" are a feature of the landscape.

The Epping silt loam is not an important farming soil, as it is droughty and has an unfavorable and badly eroded surface. It is used exclusively as pasture land. The native vegetation consists of western wheat grass, buffalo grass, and grama grass, the first predominating. The grass growth over much of the type is sparse, even in favorable seasons.

This soil will support 40 to 45 head of cattle per square mile during the summer season, from June 1 to October 1.

Land of the Epping silt loam sells for $8 to $10 an acre, depending upon the topography and improvements.

SCOTT SILT LOAM.

The surface soil of the Scott silt loam is a brown to grayish-brown heavy silt loam 6 to 8 inches deep, generally high in silt and containing very little coarse material. The surface 4 inches contains much organic matter and has a much darker color than the lower part of the soil. The subsoil is a dark-gray to almost black, compact clay, extending to an average depth of 4 feet. It is almost impossible to bore through this material with a soil auger on account of its stiff, compact structure. In places the subsoil changes abruptly at about 30 inches into a loose, friable very fine sandy loam. Both soil and

subsoil effervesce freely with hydrochloric acid, indicating a high lime content.

The Scott silt loam is a very inextensive though widely distributed soil. It occurs in small scattered areas throughout the upland plains in the northern and central parts of the county. One of the largest areas lies about 8 miles southeast of Hay Springs. Another large area occurs 2½ miles north of the Chicago & North Western Railroad, near the eastern county line. A small though very typical area lies in the town of Rushville.

The soil consists of sediments from the surrounding types, deposited in shallow, circular basins or depressions. Owing to the impervious nature of the subsoil, water often accumulates in these depressions, forming ponds after heavy rains. It disappears very slowly, and drainage is poor over the greater part of the type. On account of its small extent and poor drainage, this soil is used solely as pasture and hay land. The native vegetation consists chiefly of grama grass and buffalo grass, which, owing to the more favorable moisture conditions, grow better than on the surrounding types. About 8 acres are required to support each head of stock on this soil, with hay fed in severe weather. The native grasses yield one-half to 1 ton per acre, depending upon the rainfall.

It is difficult to give land values on this type, as the areas are generally small and included with soils of other series. A rough estimate should place the value at $8 to $10 an acre. Farms on which this soil occupies a considerable acreage have a reduced selling value.

Many farmers haul barnyard manure and stack straw on this type in an effort to increase its water-holding capacity and prevent surface accumulations of alkali salts. It is doubtful, however, if this method will give the desired results, as the heavy, impervious subsoil is largely the cause of the surface accumulations. If land values were greater, it might be profitable to reclaim the type by breaking the subsoil in places with dynamite, or by draining it with deep ditches.

VALENTINE SAND.

The surface soil of the Valentine sand is a loose, incoherent, gray to light grayish brown sand, the immediate surface layer, owing to a small content of organic matter, being somewhat darker than the lower portion. The subsoil, which differs little in texture from the surface material, is gray to light gray in color. Below a depth of about 20 inches it is devoid of organic content, and becomes identical with the subsoil of Dunesand.

The Valentine sand occurs extensively in the southern half of the county. It is generally found adjacent to Dunesand or to other

soils of the Valentine series. Areas are irregular in outline and vary in size from a few acres to several square miles. A very large and uniform area lies south of the Niobrara River in T. 30 N., R. 42 W. Another large, though very irregular area, occurs in Ts. 27 and 28 N., Rs. 45 and 46 W. Many large areas are mapped in the central and western parts of the county, and a few smaller ones north of the Niobrara River. The Valentine sand is probably derived in part from the weathering of the Arikaree formation, but the soil has been greatly modified by the addition of finer material from the sand hills. The topography varies from flat to slightly rolling, differing from that of the Dunesand in its smoothness and the absence of drifting sand. Drainage is everywhere good and over most of the type excessive, on account of the loose, porous nature of the subsoil.

The Valentine sand is not an important type, and very little of it is under cultivation. As pasture land it ranks between the Dunesand and the heavier members of the Valentine series. The native vegetation includes a number of nutritious grasses, of which stipa or sand grass and grama grass are the most important. The type will support 50 to 60 head of cattle per square mile the year round. The yield of hay is from one-fourth to three-fourths ton per acre.

Land of this type brings from $12 to $14 an acre.

It is probably inadvisable to use any part of this type for crop production, as the soil blows badly when the sod is removed. It is, however, a valuable pasture and hay soil, the growth of grasses being considerably heavier than on the adjoining areas of Dunesand.

VALENTINE LOAMY SAND.

The Valentine loamy sand, to a depth of 8 to 12 inches, is a light-brown to brown, loose, friable loamy sand. In places the upper 6 inches is slightly tinged with red. On low ridges and knolls, where conditions have been unfavorable for the incorporation of organic matter, the soil is loose and incoherent. The subsoil is a gray or dark-gray loamy sand to sand which gradually becomes lighter in color with depth. Between 30 and 36 inches the lower subsoil often contains considerable silt and clay, so that it is sticky when wet. The substratum is a loose, incoherent gray sand, resembling the subsoil of the Dunesand.

In a narrow strip along the western county boundary, bordering Box Butte County, the surface soil contains a relatively large proportion of fine sand and is a loamy fine sand in texture. These strips, however, are of such small extent and the textural difference so slight that they are included with the Valentine loamy sand in mapping.

The Valentine loamy sand is an extensive soil in the southern half of the county. It occurs mainly south of the Niobrara River, in the

low, level flats adjacent to areas of Dunesand. Large areas are mapped, however, north of the river. One of the largest and most typical areas occurs south of the river in T. 31 N., R. 41 W. Another large development lies on the north side of the river in T. 31 N., R. 42 W. A large though not so uniform area occurs east of Box Butte Creek, in T. 28 N., Rs. 45 and 46 W.

The origin of the Valentine loamy sand is difficult to determine. Apparently the material was originally weathered from Tertiary rocks, and has since been shifted by wind and water, redeposited, and subsequently weathered. Most of the type appears to consist partly of colluvial material deposited in depressions where the accumulation of organic matter has been favored.

The topography is flat to gently undulating, interrupted by small ridges and knolls composed of sand brought down from the dunes. Drainage, which is entirely subterranean, is adequate throughout the type, the loose, porous sands affording an ample outlet for all the surplus water.

The Valentine loamy sand has about the same agricultural value as the Rosebud loamy fine sand. It is subject to drifting when cultivated, and for this reason most of it is used as pasture and hay land rather than for cultivated crops.

Small areas are cultivated in depressions where crops can get moisture through seepage. The native vegetation consists of stipa or needle grass, grama grass, sand grass, and some Buffalo grass. Hay is the most important crop.

The principal cultivated crops are wheat, potatoes, and corn. Wheat yields from 8 to 20 bushels, with an average of about 10 bushels per acre. Potatoes average about 85 bushels. Corn yields 12 bushels per acre in average years, and hay from one-fourth to three-fourths ton, depending upon the rainfall. The type is capable of supporting 25 to 35 head of cattle per square mile when used for all-year range, and about 100 head when grazed only during the summer months. The most popular variety of potatoes grown is the White Eureka, or Flat Cobbler. The potato crop is planted somewhat earlier than on the heavier soils. Land previously in wheat or in corn is commonly used in growing potatoes. The seed is placed between listed ridges.

The selling price of the Valentine loamy sand ranges from $20 to $40 an acre, depending upon improvements and location.

VALENTINE FINE SANDY LOAM.

The surface soil of the Valentine fine sandy loam is typically a brown to grayish-brown, loose, friable fine sandy loam, averaging about 12 inches in depth, but in places it contains a relatively large

percentage of very fine sand and silt, giving it a somewhat heavier texture. The upper subsoil differs little in texture from the soil, but it gradually becomes lighter in color and texture with depth and at about 24 inches is a light-brown to light grayish brown, loamy fine sand to fine sand. In some places the subsoil contains greater though varying amounts of silt and clay below 24 inches, which tends to give it a more compact structure and sticky nature. Both soil and subsoil are deficient in organic matter and lime.

This is an extensive soil in the eastern part of the county. It occurs in irregular areas varying in size from a few acres to several square miles. The largest area, covering approximately 23 square miles, lies north of the Niobrara River. It is irregular in outline, and includes numerous developments of other soils.

The origin of the Valentine fine sandy loam, like that of the other members of the series, is difficult to determine. It has probably been formed partly by weathering from sandy strata of the Tertiary and partly through accumulation of materials by wind and colluvial action. To the weathered rock products there thus have been added washed-out finer materials of the adjacent sand hills, which make the type more stable than the coarser members of the series.

The Valentine fine sandy loam usually occupies level areas, often situated at a considerable distance from the Dunesand. Large areas, however, are gently undulating to rolling. Drainage is good, though not excessive. The porous soil and subsoil absorb most of the light rainfall.

By far the greater part of this type is used as pasture and hay land, but it is nevertheless an important agricultural soil. The native vegetation consists of sand grass, stipa grass, buffalo grass, grama grass, and small amounts of bunch grass. Approximately 10 per cent of the type is under cultivation, all the crops common to the region being successfully grown. The loose, porous structure permits the rainfall to enter readily and makes it easy to get the surface in a condition to hold the absorbed water. Wheat, potatoes, corn, and oats are the principal crops. Alfalfa is grown to a small extent. Small fields of emmer, flax, and beans are grown. Wheat is the principal cash crop. It yields from 10 to 30 bushels, with an average of about 15 bushels per acre. Potatoes rank second in importance as a cash crop. The yield ranges from 75 to 200 bushels, with an average of about 100 bushels per acre. Corn is grown chiefly for feed on the farms and ranches. It gives an average yield of about 18 bushels per acre. Oats are also grown for home consumption. The average yield of this crop is about 30 bushels per acre. The native grasses produce from one-fourth to three-fourths ton of hay per acre, and the type will support 30 to 40 head of cattle per square mile the year round.

Land of the Valentine fine sandy loam can be bought for $25 to $50 an acre, depending upon the improvements and the location with respect to railroads and markets.

While this soil is naturally more retentive of moisture than the heavier types, it is not advisable to keep the surface soil too well pulverized because of the danger of drifting.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Valentine fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372821	Soil	0.2	1.0	2.5	41.2	31.9	16.4	6.6
372822	Subsoil	.1	.7	2.0	40.2	34.0	17.8	5.2

VALENTINE VERY FINE SANDY LOAM.

The Valentine very fine sandy loam to a depth of 8 to 12 inches is a brown to dark grayish brown, loose, friable, very fine sandy loam, varying in depth and color with the content of organic matter, the surface soil being almost black where conditions have favored the growth and decay of plants. The subsoil differs little in color or texture from the surface material. It is a loose friable loamy fine sand to very fine sandy loam, dark brown to light brown in color. The subsoil below about 24 inches usually contains considerably more coarse sand than the upper part and is somewhat lighter in color. Both soil and subsoil are noncalcareous.

The Valentine very fine sandy loam is of very small extent in Sheridan County. It occurs chiefly in the northeastern part, contiguous to the Dunesand. The largest and most uniform area covers about 2 square miles in T. 34 N., Rs. 41 and 42 W.

Like the other members of the series, this type probably represents weathered Tertiary material, together with wind-blown and water-washed particles from the adjoining sand hills. It has probably been subjected to longer and more thorough weathering than the other members of the series.

The topography varies from flat to gently undulating, the surface being modified by scattered depressions and low hummocks which have resulted from wind action. In general, the type is almost flat and the drainage subterranean.

Owing to its small extent, this is an unimportant type agriculturally, although it is well suited to all the crops grown in the region and ranks first among the Valentine soils in productiveness. It is used at present exclusively as pasture and hay land. The native

vegetation consists of grama grass, sand grass, stipa grass, western wheat grass, and small amounts of big blue-stem and buffalo grass. Native hay yields one-fourth to three-fourths ton per acre, depending upon the rainfall. The type will support from 30 to 40 head of cattle per square mile the year round.

Land of the Valentine very fine sandy loam can be bought for $20 to $35 an acre, the price depending upon the character of the improvements and the distance from market or shipping points.

GANNETT FINE SANDY LOAM.

The surface soil of the Gannett fine sandy loam is a very dark brown to black fine sandy loam, with an average depth of about 10 inches. In some places the type contains a relatively large percentage of fine and medium sand and approaches a loamy fine sand in texture. Over much of its extent it has a spongy structure and is appreciably light in weight, owing to a large content of decayed organic matter. The organic content, which varies greatly, is great enough where conditions have been most favorable for plant growth to give a soil closely resembling Muck. The subsoil is a dark-gray to grayish-brown, incoherent fine sand to loamy sand. It is relatively low in organic matter and lacks the porous, compressible nature which so often occurs in the surface soil. The subsoil continues to a great depth and below about 4 feet is similar to that of the Dunesand. In the more poorly drained parts of the type there is sometimes a thin layer of dark-gray or black silty clay, lying generally below 30 inches, and in places where this layer is present water stands on the surface throughout the year. Both the soil and subsoil of this type are highly calcareous.

The Gannett fine sandy loam is a widely distributed soil. Its region of occurrence is coextensive with that of the Dunesand, for it normally occupies small, irregular, depressed areas, separated by narrow strips of Valentine soil and by ridges of Dunesand. One of the largest and most uniform areas occurs in the vicinity of Twin Lake, in T. 27 N., R. 44 W. Another large area extends along Pine Creek, in T. 28 N., R. 44 W., and smaller areas are mapped throughout the sandhill region in the southern part of the county.

The Gannett fine sandy loam has been formed of the same material as the Dunesand, modified by the decay and incorporation of organic matter. Upon close examination, the sand grains are seen to be slightly more rounded and less angular than those of the Dunesand.

A shallow water table, permitting the heavy meadow grasses to make a rank growth, is very characteristic of this type. It has developed wherever the surface of the incoherent sand has been lowered to approximately the level of the water table underlying the sandhills. The topography is flat to very gently undulating. Drainage

is poor over most of the type, and the lower portions are often occupied by shallow lakes and marshes, some of which are of considerable size.

The Gannett fine sandy loam is one of the most important soils in the sandhill section of the county. It is used almost exclusively as hay land and very little for pasture. The native grasses consist of big bluestem, switch grass, western wheat grass, Indian grass, wild timothy, and needle grass. These nutritious grasses yield the principal part of the annual crop of hay, so necessary to the successful wintering of cattle in the sandhill region. Heavy growths of sedges and rushes displace the hay grasses in the lakes and marshes. The native vegetation ends sharply around the edges of the meadows, where the greater elevation and deeper water-table mark the beginning of the Valentine and Dunesand soils.

Hay yields from three-fourths to 1½ tons per acre. Over most of the type hay is cut between September 15 and October 15 and stacked for winter feed. When used for pasture the type will support from 80 to 90 head of cattle per square mile the year round.

The land of the Gannett fine sandy loam can be bought for $25 to $30 an acre. It is generally sold, however, in connection with the grazing land of the sand hills, and the price obtained depends upon the percentage of hay land present.

This type should probably be used exclusively in the production of native hay, as the soil blows badly when plowed and is not adapted to most farm crops. Within the last few years many drainage ditches have been established and these, together with the pumping of the lakewater for evaporation in the potash-reduction plants, is gradually increasing the acreage of the land suited to the production of hay.

Mechanical analyses of samples of the soil and subsoil of the Gannett fine sandy loam gave the following results:

Mechanical analyses of Gannett fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372801	Soil	0.4	0.9	1.8	61.8	15.2	9.3	10.4
372802	Subsoil	.1	.3	1.7	70.8	16.1	6.1	4.8

GANNETT VERY FINE SANDY LOAM.

The surface soil of the Gannett very fine sandy loam is a dark-gray to almost black very fine sandy loam, generally loose and friable, and containing large amounts of organic matter, giving it a spongy

structure and light weight. The surface soil differs little from that of the Gannett fine sandy loam, except in texture. The soil grades rather sharply at 8 to 12 inches into a dark-gray to light-gray fine sand to loamy fine sand. Both soil and subsoil are generally wet, and the latter is slightly sticky. Below an average depth of 24 inches a gray fine sand is encountered, and the lower subsoil resembles that of the Gannett fine sandy loam.

The Gannett very fine sandy loam occurs chiefly in the extreme northeastern part of the county, only a few small areas being mapped in the southern part. The areas are relatively small, rarely covering a square mile. A very typical area is mapped around Margrave Lake, in the northeastern part of the county.

Like the Gannett fine sandy loam this type has been formed from Dunesand material, or from the finer wind-assorted particles, much modified by the decay and incorporation of organic matter. Favorable conditions for the formation of this type existed in times past, when old valleys and drainage ways were choked by drifting sand. The type is also developed in pockets and swales between sand ridges. It has a flat surface, generally slightly sloping toward a lake or marsh in the center of the area. Drainage is poor and the soil boggy except during periods of prolonged drought.

This soil ranks with the Gannett fine sandy loam, but owing to its small extent it is not nearly so important. It is used exclusively for hay land. The native vegetation consists of salt grass, big blue stem, stipa grass, Indian grass, and wild timothy. Sedges and rushes occur in the lakes and marshes. Hay yields from one-half ton to 1½ tons per acre. The crop is used for the winter feeding of cattle and horses.

This soil ranges in selling value from $25 to $30 an acre. As with the Gannett fine sandy loam, however, the price is governed by the percentage of grazing land included in any particular tract. The more hay land a ranch contains the higher the selling price.

Owing to the danger of drifting it is not deemed advisable to plow any of this type, except possibly the heavier textured parts. Under cultivation timothy and clover would probably be more profitable than the present stand of native grasses. The ultimate aim in handling this soil should be to produce more forage for the winter feeding of cattle. An adequate system of drainage ditches would remove much of the water from the present lakes and marshes, and greatly increase the acreage of available hay land.

TRIPP FINE SANDY LOAM.

The surface soil of the Tripp fine sandy loam is a grayish-brown to brown loose, friable fine sandy loam, 10 to 14 inches deep. The upper 6 inches is somewhat darker in color than the lower portion,

due to a large amount of organic matter. In small areas the soil contains a larger proportion of fine and medium sand than typical, the texture approaching a loamy fine sand. In places the soil contains so little fine material that it is subject to drifting when plowed. The typical subsoil is a light-gray to ashy-gray very fine sandy loam, containing in most places more silt and clay than the surface material and having a slightly more compact structure. The subsoil below 20 inches and the substratum are highly calcareous.

The Tripp fine sandy loam, the extent of which is relatively small, occurs in narrow, elongated strips along the Niobrara River and the main streams in the northern part of the county, generally in association with the Tripp very fine sandy loam. The largest areas lie along the Niobrara River, adjoining the first bottom or flood plain. Smaller areas occur on Beaver, White Clay, Larrabee, Antelope, Rush, and Hay Springs Creeks.

Like the other types of the Tripp series, the fine sandy loam is composed of sediments brought down from the adjoining uplands and deposited on terraces along the stream. It represents old alluvium and is in an advanced stage of weathering.

The topography is flat to very gently undulating, but drainage is adequate, as there is sufficient slope to carry off most of the surplus water and the loose, porous soil and subsoil afford ample underground drainage.

This type has about the same value for farming as the Tripp very fine sandy loam. Approximately 25 per cent of it is under cultivation, the rest being used as pasture and hay land. The native vegetation consists of sand grass, grama grass, buffalo grass, and small amounts of western wheat grass. All the crops common to the region can be successfully grown. Alfalfa is by far the most important crop, with wheat and corn ranking next. Potatoes, rye, and oats are grown extensively. Wheat is the principal cash crop. It is hauled to elevators and mills at Rushville, Gordon, and Hay Springs. Alfalfa and corn are used for feed upon the farm where grown. As with the Tripp very fine sandy loam, most farms on this type include considerable upland soil, which is used for pasture. Cattle raising is an important industry. Beef breeds, mainly Hereford and Shorthorn, are raised extensively, but dairy cattle, mostly of the Holstein breed, are kept on some of the farms. A few hogs are raised on nearly every farm. They are pastured on alfalfa during the summer and either shipped directly as feeders or fattened on corn.

Alfalfa yields 1½ to 2½ tons per acre from two cuttings, depending upon the rainfall. In average years wheat yields about 18 bushels per acre; corn, 20 bushels; rye, 15 bushels; oats, 30 bushels; and potatoes, 100 bushels. This type is prepared for crops in the same manner

as the Tripp very fine sandy loam. No systematic crop rotation is followed, and fertilizers are not used as the soil is new and in no immediate danger of becoming exhausted.

Land of the Tripp fine sandy loam can be bought for $25 to $30 an acre, depending upon the improvements and location.

Results of mechanical analyses of samples of the soil and subsoil follow:

Mechanical analyses of Tripp fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372815	Soil	1.0	3.8	7.3	40.4	24.5	16.2	6.7
372816	Subsoil	.1	.5	.8	22.7	44.4	26.3	5.3

TRIPP VERY FINE SANDY LOAM.

The surface soil of the Tripp very fine sandy loam consists of 8 to 10 inches of a light-brown to brown very fine sandy loam relatively high in the finest grade of sand and silt and low in material coarser than fine sand. The surface 6 inches usually contains much organic matter. The subsoil is a light-brown to ashy-gray silt or very fine sandy loam, the upper part, between 10 to 16 inches, in places being slightly more compact than the rest of the soil section. Below 20 inches the material is loose and floury and composed largely of very fine sand and silt. It is almost white in color and highly calcareous and much resembles the subsoil of the Rosebud very fine sandy loam.

The Tripp very fine sandy loam occupies high terraces or benches along the drainageways in the northern half of the county. The largest areas lie along Antelope Creek and its tributaries in the east-central part. Large developments are also mapped along Beaver and Rush Creeks in the northwestern and north-central parts and smaller areas along Larrabee, White Clay, and Wounded Knee Creeks.

The type has been formed by the weathering of an admixture of sediments brought down from the Arikaree and Brule clay formations. The topography is flat to very gently undulating, but the greater part of the type has sufficient slope to carry off the surplus water.

Although this soil is not extensive, it is important on account of its productiveness and adaptability to cultivation. It gives good yields of all the common crops. Between 40 and 50 per cent of it is under cultivation, a higher proportion than in the case of any other soil in the county. The rest is used as pasture and hay land. The native vegetation consists chiefly of buffalo grass and grama

grass. Alfalfa is the most important crop, followed by wheat and corn. Oats, rye, and potatoes are grown quite extensively. The farms on this type include more or less upland soil, which is used for pasture. The feed crops grown on the Tripp soils are used to carry stock through the winter months or for fattening it for market. Cattle raising is the chief industry on this soil. A few pure-bred Hereford herds are raised, but most of the animals are Hereford or Shorthorn grades. The cattle are usually shipped to Omaha as feeders when taken off the summer range. Hogs are raised quite extensively, being pastured on alfalfa during the summer and either shipped as feeders or fattened on corn early in the fall. Dairying is carried on a little more extensively than on the upland soils. Much of the cream is shipped to Chadron, in Dawes County. A few horses are raised on every farm.

Alfalfa yields 1½ to 3 tons per acre from two cuttings. Wheat averages about 20 bushels per acre, corn 20 bushels, oats 30 bushels, rye 18 bushels, and potatoes 100 bushels.

In preparing the land for crops it is usually stirred in the spring as soon as the frost is out of the ground. The seed bed for small grain is generally prepared by double-disking land previously in corn or small grain. Old land is plowed every third or fourth year. Corn is listed in, as this method conserves moisture better than level cultivation. No definite system of crop rotation is followed and no fertilizers are used.

The selling price of areas of the Tripp very fine sandy loam depends largely upon its improvements and location. The average is about $30 an acre, but good farms near railroad towns bring as much as $80 an acre.

This is probably the best agricultural soil of the Tripp series. It is retentive of moisture and can be cultivated shortly after heavy rains without serious impairment of its physical condition. Much of the type, especially those areas along Beaver Creek in the northwestern part of the county, is admirably suited to irrigation, and this would greatly increase the yields of all crops, as moisture is the limiting factor under natural conditions.

Below are given the results of mechanical analyses of samples of the soil and subsoil of the Tripp very fine sandy loam:

Mechanical analyses of Tripp very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372817	Soil	0.0	0.7	0.2	10.0	38.1	39.4	11.4
372818	Subsoil	.0	.5	.4	21.6	30.4	37.8	9.2

TRIPP SILT LOAM.

The surface soil of the Tripp silt loam is a grayish-brown to brown, friable silt loam, relatively high in very fine sand, 8 to 12 inches deep. The immediate surface layer is rich in organic matter, which gives it a darker color than the underlying material. The upper subsoil is a light-gray to ashy-gray silt loam, becoming lighter in color with depth. At about 24 inches the material becomes a loose, floury silt to silty clay, which continues throughout the 3-foot section. In some places the upper subsoil is slightly compact in place, but it readily breaks down into a loose, floury silt. The subsoil is very calcareous.

The Tripp silt loam is of small extent in Sheridan County. The largest area lies about 5 miles south of Hay Springs, in the west-central part of the county. Another large area is mapped along Antelope Creek, about 3 miles northwest of Gordon, and smaller areas along Hay Springs and Beaver Creeks.

The type is alluvial in origin, being derived from sediments washed from the Arikaree, Gering, and Brule clay formations.

The surface is almost flat, but slopes gently toward the stream channels. The slight slope, together with the porous nature of the soil and subsoil, affords ample drainage.

Owing to its small extent, this is not an important agricultural soil. Approximately 25 per cent of it is under cultivation, and the rest supports an excellent growth of pasture and hay grasses, in which western wheat grass, grama grass, buffalo grass, and big bluestem predominate. Of the cultivated crops, wheat, rye, potatoes, alfalfa, and corn are most important, the first three being the principal cash crops. Alfalfa and corn are grown for feed. Most of the type is used for raising live stock, chiefly cattle, though a small drove of horses are kept on nearly every farm, and hogs are gaining in importance. Hogs are allowed to run in the alfalfa fields during the summer season, and are fattened on corn early in the fall. Dairying is not carried on extensively, but every farm has some dairy products to sell. About 6 acres are required to support a cow during the summer season, from June 1 to October 1. Hay is fed during the winter months.

The average yield of hay from native grasses is one-half ton per acre. Alfalfa yields from three-fourths to 1 ton in two cuttings. In average years wheat yields about 20 bushels per acre, rye 18 bushels, potatoes 150 bushels, and corn 20 bushels. The methods of cultivating and handling the soil are the same as on the Rosebud silt loam. No fertilizers are used.

Land of the Tripp silt loam can be bought for $20 to $30 an acre, depending upon the improvements.

Farmers on this type realize that the largest returns are obtained from a combined system of stock and grain farming, in which the hay and grain are fed to cattle, hogs, and horses, and the necessity of hauling is reduced to a minimum.

YALE VERY FINE SANDY LOAM.

The Yale very fine sandy loam in this county is identical with that mapped along Box Butte Creek in Dawes County. The soil to a depth of 8 to 12 inches is a grayish-brown to brown, loose friable very fine sandy loam. The surface layer contains a large amount of organic matter, which gives it a darker color than the underlying stratum. Between 12 and 18 inches there is a slightly compact layer of very fine sandy loam to silt loam, generally lighter in color than the surface material. This layer contains a large amount of silt and clay, probably accumulated through the translocation of the finer soil particles and their concentration in this zone. Below 18 inches the subsoil is a gray to almost white silt loam to very fine sandy loam, loose and friable. The heavy layer of the upper subsoil sometimes extends throughout the 3-foot section, but ordinarily it is not more than 6 or 8 inches thick. The subsoil is highly calcareous.

The Yale very fine sandy loam is developed in a narrow strip on the high terrace or bench along Box Butte Creek, in the western part of the county. The soil is alluvial in origin, representing sediment washed down from the adjoining uplands, reworked and deposited by the stream, and subsequently weathered into the present material. The surface is quite flat, but it slopes gently toward the stream channel and the drainage is good.

Owing to its small extent, this type is of little agricultural importance. It is used exclusively as pasture and hay land. The native vegetation consists of grama grass, buffalo grass, sand grass, and small amounts of western wheat grass. The type is naturally retentive of moisture, and the yield of hay is somewhat larger than on the adjoining uplands, from one-half to three-fourths ton per acre being obtained in average years. The type will support 25 to 35 head of cattle per square mile the year round, hay being fed during severe weather.

Land of the Yale very fine sandy loam sells for $25 to $30 an acre, depending upon the improvements.

Below are given the results of mechanical analyses of samples of the soil, subsoil, and lower subsoil of the Yale very fine sandy loam:

Mechanical analyses of Yale very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372855	Soil	0.8	0.6	0.6	20.5	45.3	23.1	9.3
372856	Subsoil	.0	.0	1.7	46.8	32.1	8.5	10.9
372857	Lower subsoil	.0	.2	.5	25.6	34.8	25.4	13.1

ORMAN SILTY CLAY LOAM.

The surface soil of the Orman silty clay loam to an average depth of 10 inches is a grayish-brown silty clay loam. Over small areas the soil has the slaty or olive-brown color so characteristic of soils derived directly from the Pierre shale formation. The surface material is extremely sticky when wet and cracks badly upon drying. The upper subsoil to a depth of about 20 inches is a dark-gray to olive-brown clay or silty clay, very hard and compact in structure. Below 20 inches the material gradually becomes lighter in color, and the lower subsoil is a gray to a light grayish brown compact clay. The Pierre shale lies 4 to 6 feet below the surface and is exposed in the banks along stream channels.

The Orman silty clay loam occurs chiefly as a narrow strip of high-terrace material along Lime Kiln Creek in the extreme northwestern part of the county. Another small area lies along Beaver Creek in T. 34 N., R. 46 W.

The type is of alluvial origin, representing sediments brought down from the Pierre clay and clay loam areas. In this county it has been modified by material from the Niobrara and Brule clay formations, which has given it a somewhat lighter color than the typical Orman silty clay loam mapped in Dawes County.

The topography is nearly flat, sloping gently down the valley and toward the stream. Drainage is good throughout the type. The heavy subsoil retards percolation, but the slight slope affords ample run-off. It is difficult to obtain well water on this type, and the few wells yield hard alkaline water unfit for household purposes.

Owing to its small extent and intractable nature, this soil is of little agricultural importance. It is used exclusively as pasture and hay land. The native vegetation consists of western wheat grass, grama grass, and some buffalo grass, the first predominating. The yield of hay is considerably below that on any of the Rosebud soils, in average years one-fourth to one-half ton per acre being obtained.

The type will support from 20 to 25 head of cattle per square mile throughout the year.

The selling price of this land ranges from $10 to $15 an acre, depending upon the improvements and water supply.

This soil gives the largest returns when used for pasture and hay production. It is too heavy for successful cultivation and is so droughty that crops mature only in the most favorable years.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Orman silty clay loam:

Mechanical analyses of Orman silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372827	Soil	0.0	0.6	0.3	5.5	26.6	48.5	18.4
372828	Subsoil	.2	.6	.7	8.2	25.3	44.9	20.1

LAUREL FINE SANDY LOAM.

The Laurel fine sandy loam, to a depth of 8 to 12 inches, consists of a light-brown to gray, loose fine sandy loam. The surface 6 inches is high in organic matter. The upper subsoil is a gray to light-gray, loose very fine sandy loam. Below 20 inches the material is coarser in texture often becoming a gravelly sandy loam. Both soil and subsoil are high in lime.

This type occurs in an almost continuous strip, varying in width from one-sixteenth to one-half mile, along the Niobrara River. It is also mapped in short, broken strips along the larger streams throughout the northern half of the county. A very typical and uniform area lies on Rush Creek south of Rushville, and another along Antelope Creek in T. 32 N., R. 41 W.

The type is formed of recent alluvium, and in many places is still in the process of formation. The topography is flat, and adjacent to the stream channels the soil is poorly drained and subject to overflow.

The Laurel fine sandy loam is not extensive, and only a small percentage of it is under cultivation. The type is used chiefly as pasture and hay land. Alfalfa is grown on the better drained portions, and yields 1½ to 2½ tons per acre, depending upon the season. The crop is cut twice. Native hay yields one-half to 1 ton per acre. The native vegetation consists mainly of grama grass, western wheat grass, and wire grass. Along the Niobrara River there is a fairly dense tree growth, including cottonwood, willow, chokecherry, and plum. On the larger drainageways in the northern part of the county a sparse growth of ash and elm covers parts of the type. The land is capable

of supporting 40 to 50 head of cattle per square mile throughout the year.

The selling price of land of the Laurel fine sandy loam type ranges from $25 to $30 an acre, depending upon the improvements and drainage conditions.

This soil is best suited to the production of native hay and alfalfa, as it blows badly when cultivated and the frequent overflows make grain crops uncertain.

LAUREL VERY FINE SANDY LOAM.

The surface soil of the Laurel very fine sandy loam is a grayish-brown, loose, friable, very fine sandy loam, 8 to 12 inches deep, rich in organic matter. The subsoil is a light-gray to light-grayish brown, loose fine sand, in many places mottled brown or drab as a result of poor drainage. In some places the upper subsoil, between 12 and 18 inches, is slightly compact, owing to a relatively large content of silt and clay. Below 24 inches fine gravel and coarse sand occur in some areas. The subsoil contains much lime.

The Laurel very fine sandy loam occurs in scattered, narrow strips along the larger streams throughout the upland. It is not so extensive as the fine sandy loam member of the series. A typical area occurs on Rush Creek about 1½ miles west of Rushville.

The type has been derived in the same manner as the Tripp fine sandy loam. It represents recent alluvium lying within the first bottom or present flood plain of the streams, and is subject to the deposition of additional sediments at each flood. The topography is flat, and in places the type is poorly drained. It is subject to frequent overflows.

This soil does not cover a large total area, but it is the most important first-bottom soil in the county. It does not drift when cultivated, as does the Tripp fine sandy loam. A larger proportion, about 20 per cent, is used for crop production. The rest is devoted to pasture and the production of hay. The native grasses include grama grass, big bluestem, wire grass, and western wheat grass. Owing to better moisture conditions, the growth is much heavier than on the upland types. Elm, ash, willow, cottonwood, and box elder constitute the tree growth. The timber is used to a small extent for firewood and fence posts. The most important cultivated crop is alfalfa. Corn, wheat, and potatoes also are grown. The principal agricultural industry on this soil is the raising of beef cattle. The type will support 40 to 50 head of cattle per square mile, when hay is fed during severe weather. Hogs are raised extensively, alfalfa being an important feed in their ration. Dairying is carried on in a small way. The cream is shipped to outside markets.

Native hay yields one-half to 1 ton per acre, alfalfa 2 to 3 tons from two cuttings, corn 20 to 25 bushels, wheat about 20 bushels, and potatoes 150 bushels.

Land of the Laurel very fine sandy loam type sells for $30 to $40 an acre, depending upon the improvements and drainage.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Laurel very fine sandy loam:

Mechanical analyses of Laurel very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372844	Soil	0.9	1.3	1.3	19.5	35.5	34.2	7.0
372845	Subsoil	.7	5.8	6.3	26.2	39.7	14.7	6.2

LAUREL SILTY CLAY LOAM.

The surface soil of the Laurel silty clay loam is a gray to grayish-brown, heavy silty clay loam, 10 to 15 inches deep. The soil is sticky and intractable when wet, and cracks upon drying. The subsoil is yellowish gray to light gray and often mottled brown or drab, owing to poor drainage. It varies widely in texture. In the northwestern part of the county the subsoil is very similar to that along Beaver Creek in Dawes County, consisting of a gray, yellowish-gray, or grayish-brown silt to silty clay, low in sand and usually compact throughout the 3-foot section. Elsewhere the subsoil is composed of loose, friable silt to very fine sandy loam. Below 30 inches coarse sand and fine gravel is often encountered. Throughout its extent the type has a highly calcareous soil and subsoil.

The Laurel silty clay loam occurs as a narrow strip of bottom land along Beaver Creek, in the northwestern part of the county, and along Hay Springs Creek in the west-central part. It consists of sediments brought down and deposited by streams. Its heavy structure is probably due in large measure to the nature of the upland formations from which the sediments were derived. In the northwestern part of the county wash from the Pierre clay has greatly influenced the texture.

The surface is flat and drainage is generally poor. In addition, the type is subject to flooding during periods of high water. Owing to its small extent and poor adaptation to crops, this is an unimportant type in Sheridan County. It is used exclusively as pasture and hay land. The native grasses consist of western wheat grass, grama grass, and wire grass. Scattered willow, ash, and cottonwood occur

along Beaver Creek. This type will support 40 to 50 head of cattle per square mile throughout the year, and it yields three-fourths to 1 ton of hay per acre.

The Laurel silty clay loam sells for $20 to $30 an acre, depending upon the improvements, location, and drainage.

Results of mechanical analyses of samples of the soil and subsoil of the Laurel silty clay loam follow:

Mechanical analyses of Laurel silty clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
372813.....	Soil.....	0.0	1.9	1.9	10.1	12.6	43.3	30.4
372814.....	Subsoil.....	.1	.7	.3	6.6	23.8	48.9	19.5

DUNESAND.

Dunesand is a name applied to the soil occupying the extensive area known as the sand hills. The surface material is a gray to yellowish-gray or brownish-gray loose, fine to medium sand, the latter grade predominating. The soil contains some organic matter, but not enough to prevent drifting when the covering of grasses is removed. There is very little change in color or texture to great depths, and the subsoil differs little from the surface material except in its smaller content of organic matter. Neither the soil nor subsoil is calcareous. The type is unusually retentive of moisture, considering its loose structure.

Dunesand is the most extensive type in Sheridan County, occupying about 35 per cent of its total area and occurring chiefly in the southern half. A large area is mapped in the northeastern corner. The extensive areas of the type are broken only by narrow valleys occupied by the Gannett and Valentine soils.

The Dunesand has been derived from sandy Tertiary strata, and deposited in its present position by the wind. The general absence of fine material is probably due to its removal by the wind during the continual shifting of the dunes.

The surface is sharply rolling, ridged, consisting of dunes varying from 30 to 100 feet in height. Steep slopes abound, and small hummocks of wind lodged sand, hollows, and "blowouts" are of constant occurrence, varying the otherwise billowy appearance of the landscape. Blowouts are most common on the northwest face of the dunes. At present almost none of the type is subject to active wind erosion. The intrusion of cross dunes has hindered the development of surface drainage, but the rainfall is immediately absorbed in the

loose, porous sands, and there is seldom any run-off even on the steeper slopes.

Dunesand is of little value for farming, and it is used almost exclusively for pasture, though some hay is cut on the more nearly level areas. The soil is usually well sodded except in the rougher portions, where blow-outs are of common occurrence. The native vegetation includes many valuable pasture and hay grasses, of which long-leafed reed grass, redfeldia, and stipa are the most common. In the spring and summer the grasses afford good grazing, but in the winter they can not be depended upon. The type is capable of maintaining 25 to 35 head of cattle to the square mile throughout the year, and about 90 head when grazed only during the summer. Hay is fed during the winter months.

This land sells for $10 to $14 an acre, depending upon the improvements and the proportion of land from which hay can be harvested.

The preservation of the native growth of grasses is at the foundation of the only agricultural industry apparently possible on this soil. Drifting sand along old roads and near watering tanks plainly shows the disastrous effects of disturbing the soil-binding roots. Care should be taken to prevent and control fires, which burn off the protecting covering of grasses.

ROUGH BROKEN LAND.

The term Rough broken land is applied to those extensive areas which are topographically unsuited to farming. The topography is extremely rough and broken, abounding in steep slopes, canyons, and gullies. The bedrock outcrops over much of the type, forming in many places cliffs and vertical walls. The streams, which flow in a north and northwest direction, have a steep gradient and are swift flowing. Drainage is generally excessive, and the soil material is usually shallow except along stream channels.

Rough broken land is rather extensive in Sheridan County, ranking seventh in total area amongst the soils. It occurs chiefly in irregular though continuous areas in the northwestern part. A few small areas lie south of the Niobrara River, chiefly along Pine and Deer Creeks.

The type has been carved from the underlying Tertiary sandstone, which is readily broken into a rough topography where there is active stream erosion.

This soil is used exclusively for grazing cattle and horses. There is a good growth of grasses except on the steepest slopes and cliffs. The sedge blackroot, grama grass, buffalo grass, and western wheat grass are the most important species. Scrub-pine timber occurs

extensively on the steeper slopes, while in the canyons ash, willow, cottonwood, aspen, hackberry, elm, and chokecherry make up the tree growth.

This type will support from 25 to 35 head of cattle to the square mile when grazed throughout the year. Hay is added to the ration during severe weather. The rough topography affords protection to stock during the winter months.

This land is valued only for pasture, and can be bought for $8 to $12 an acre.

SUMMARY.

Sheridan County, Nebraska, lies in the northwestern part of the State. It contains 1,557,120 acres, or 2,433 square miles. The county represents an eroded remnant of the High Plains, once covering the greater part of western Nebraska.

The Niobrara River traverses the central part of the county in a northeast-southwest direction.

The topography of the northern half varies from flat to gently undulating in the north-central part to rough and dissected in the northwestern part. The southern half is occupied largely by sand dunes and has a rolling to billowy topography.

The elevation of the county ranges from 3,500 feet to 4,000 feet above sea level.

Drainage is well established except in depressions in the upland and in the flood plains of the larger streams. The Niobrara River drains the greater part of the county, but the northwestern part is drained into White River through Beaver, White Clay, and Wounded Knee Creeks.

Sheridan County was organized from part of Sioux County in 1885. The first settlers were from Indiana and settled near the present site of Gordon. According to the 1910 census, 90.3 per cent of the inhabitants are native white persons. The population of the county amounted to 7,328 in 1910, and it has since greatly increased. The entire population is classed by the census as rural. Rushville, the county seat, Antioch, in the southwestern part, and Gordon are the largest towns.

The north-central and southern parts of the county have good transportation facilities. An adequate system of public roads reaches all the farming communities except in the sandhill region, where highways are poorly established.

Telephone and rural mail delivery routes reach the farmers throughout the county, except in parts of the sandhill section.

Omaha is the principal live-stock market for Sheridan County. Towns within the county furnish local markets for all the surplus crops and live-stock products.

The agriculture of Sheridan County consists mainly of stock raising and the production of hay and grain. The grain, with the exception of wheat, is used mainly for feed. Potatoes are an important commercial crop. The soils are "new," and no systematic crop rotation is followed.

Land ranges in value from $8 to $80 an acre, depending upon the improvements, location, topography, and soil.

On the basis of origin, the soils of Sheridan County are grouped in three classes—residual, alluvial, and eolian. The exposure and weathering of different formations of the High Plains have given rise to the residual soils, including the Rosebud, Dunlap, Pierre, Dawes, and Epping series. Sediments washed from the residual soils of the upland have produced the alluvial soils, classed in the Tripp, Yale, Orman, Laurel, and Scott series. Wind-blown material from the residual and alluvial soils has given rise to the Valentine and Gannett series and to Dunesand. Rough broken land represents badly eroded and dissected portions of the original High Plains.

The Rosebud soils are quite extensive. The silt loam and very fine sandy loam are important agricultural types. The fine sandy loam, loamy fine sand, and gravelly sandy loam are used chiefly for grazing and hay production.

The Dunlap silt loam is not an extensive type, but it is one of the best dry-land farming soils of the High Plains region. It is well suited to wheat and potatoes.

The Pierre clay loam is heavy in texture, and is farmed only to a limited extent. It is used almost exclusively for pasture and hay.

The Dawes silt loam and very fine sandy loam are good agricultural soils. The former, however, on account of its unfavorable location with respect to markets, is little used for crop production.

The Epping silt loam is a very inextensive type, used for hay production and pasture.

The Tripp series includes valuable alfalfa, corn, and potato soils. A larger proportion of the Tripp very fine sandy loam is under cultivation than of any other type in the county.

The Yale very fine sandy loam is a soil of small extent, used exclusively for pasture and for the production of hay.

The Orman silty clay loam is of little agricultural importance. It is difficult to handle, except under favorable moisture conditions, and is valued only as pasture and hay land.

The Laurel series comprises the first-bottom soils of the county. The better-drained parts of the fine sandy loam and very fine sandy loam are used for crop production. Alfalfa probably occupies the largest acreage.

The Scott silt loam is valuable only for grazing and the production of hay.

The Valentine series includes valuable hay lands. The heavier types of the series are cultivated to some extent.

The Gannett fine sandy loam and very fine sandy loam are the best hay-producing soils of the sandhill region.

Dunesand and Rough broken land, together covering more than 40 per cent of the county, are used exclusively for pasture.

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[PUBLIC RESOLUTION—No. 9.]

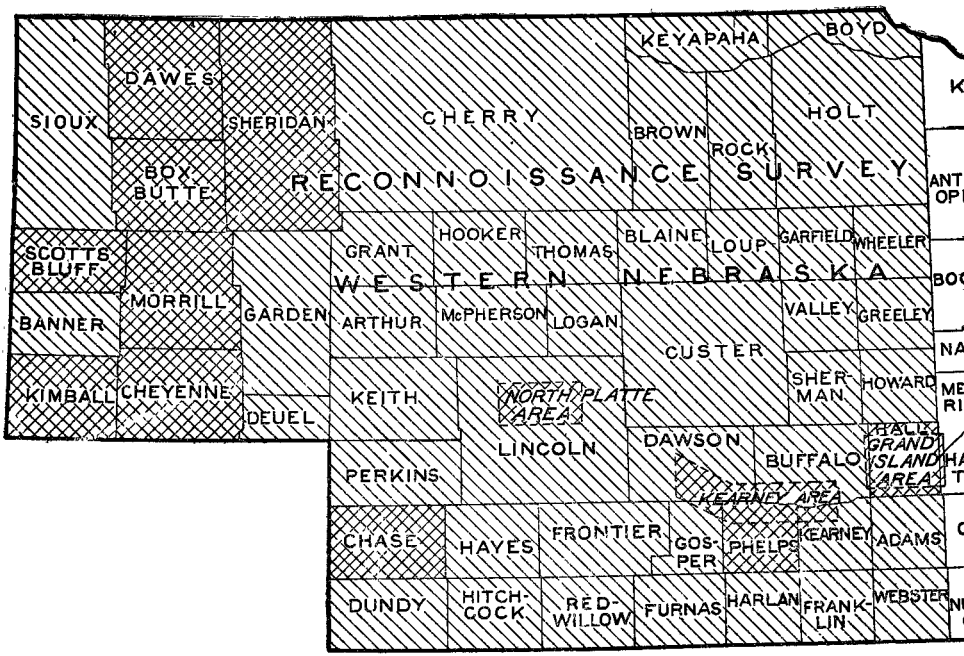
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in Nebraska.

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U.S. DEPT. OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F. MARBUT IN CHARGE SOIL SURVEY

SOIL MAP
NEBRASKA
SHERIDAN COUNTY-NORTHERN SHEET

UNIVERSITY OF NEBRASKA
G.E. CONDRA, DIRECTOR.
NEBRASKA SOIL SURVEY

LEGEND

- Dawes very fine sandy loam — Di
- Rosebud fine sandy loam — Ri
- Dawes silt loam — Da
- Rosebud very fine sandy loam — Rr
- Dunlap silt loam — Du
- Shallow phase — Sf
- Epping silt loam — Ei
- Rosebud silt loam — Rs
- Gannett fine sandy loam — Gs
- Scott silt loam — S
- Gannett very fine sandy loam — Gl
- Tripp fine sandy loam — Tf
- Laurel fine sandy loam — Ll
- Tripp very fine sandy loam — Tr
- Laurel very fine sandy loam — L
- Tripp silt loam — T
- Laurel silty clay loam — Lc
- Valentine sand — V
- Ormsa silty clay loam — Os
- Valentine loamy sand — Vs
- Pierre clay loam — P
- Valentine fine sandy loam — Vf
- Rosebud gravelly sandy loam — Rg
- Valentine very fine sandy loam — Vl
- Rosebud loamy fine sand — Ro
- Dunesand — D
- Shallow phase — Rf
- Rough broken land — R

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Cotton, Breakwater, Levee, Lighthouse, Fort.
Secondary roads and Trails
Railroads Steam and Electric
Bridge, Ferry
R.R. crossings, Tunnel
Ford, Dam
School or Church Cemeteries
Mine or Quarry, Mine dumps, Made land
Bluff, Escarpment, Rock outcrop, and Triangulation station
Stony and Gravelly areas
Soil boundaries
Boundary lines
Boundary lines
Boundary lines
U.S. township and section lines

RELIEF
(Printed in brown or black)

Contours, Depression contours
Prominent Hills, Mountain Peaks
Sand, Wash, and Sand dunes
Shore and Low-water line, Sandbar

DRAINAGE
(Printed in blue)

Streams
Lakes, Ponds, Intermittent lakes
Intermittent streams
Springs, Canals, and Ditches, Flumes
Swamp, Salt marshes
Submerged marsh, Tidal flats

The above signs are in addition to those on the map. Variations from the usage appear in some maps of earlier dates.

Thomas D. Rice, Inspector, Northern Division.
Soils surveyed by F.A. Fraser, in charge, and Louis A. Wolfanger of the U.S. Department of Agriculture, and H.J. Bedell, L. Britton, S.C.H. Taylor, and F.M. Deutsch of the Nebraska Soil Survey.

Scale 1 inch = 1 mile

Field Operations Bureau of Soils 1918.

U S DEPT OF AGRICULTURE
BUREAU OF SOILS
MILTON WHITNEY, CHIEF
CURTIS F MARBUT, IN CHARGE SOIL SURVEY

SOIL MAP
NEBRASKA
SHERIDAN COUNTY-SOUTHERN SHEET

UNIVERSITY OF NEBRASKA
G.E. CONDRA, DIRECTOR
NEBRASKA SOIL SURVEY

LEGEND

Dawes very fine sandy loam — Di
Scott silt loam — S
Gannett fine sandy loam — Gs
Tripp fine sandy loam — Tf
Gannett very fine sandy loam — Gf
Tripp very fine sandy loam — Tr
Lamrel fine sandy loam — Ll
Tripp silt loam — T
Rosebud loamy fine sand — Ro
Valentine sand — V
Shallow phase — Rs
Valentine loamy sand — Vs
Rosebud fine sandy loam — Rl
Valentine fine sandy loam — Vf
Rosebud very fine sandy loam — Rf
Yale very fine sandy loam — Yf
Shallow phase — Rf
Dunesand — D
Rosebud silt loam — Rs
Rough broken land — R

CONVENTIONAL SIGNS

CULTURE
(Printed in black)

City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort.
Secondary roads and Trails
Railroads Steam and Electric
Bridges, Ferry
R.R. crossings, Tunnel
Ford, Dam
School or Church, Cemeteries
Mine or Quarry, Mine dumps, Made land
Bluff, Escarpment, Rock outcrop and Triangulation station
Stony and Gravelly areas
Soil boundaries
Boundary lines
Boundary lines
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RELIEF
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Contours, Depression contours
Prominent Hills, Mountain Peaks
Sand Wash and Sand dunes
Shore and Low water line, Sandbar

DRAINAGE
(Printed in blue)

Streams
Lakes, Ponds, Intermittent lakes
Intermittent streams
Sloughs, Canals and Ditches, Flumes
Swamp, Salt marshes
Submerged marsh, Tidal flats

The above signs are in current use on the soil maps. Variations from the above may appear on maps of earlier dates.

Note: Boundary line between Sheridan and Box Butte Counties through Township twenty four North is in dispute. The three boundaries in question are indicated.

Thomas D Rice, Inspector, Northern Division.
Soils surveyed by F.A. Hayes, in charge, and Louis A. Wolfanger, of the U.S. Department of Agriculture and H.L. Bedell, L. Britton, S.C.N. Taylor and F.M. Deutsch of the Nebraska Soil Survey.

Scale 1 inch = 1 mile

Field Operations
Bureau of Soils
1916